The effect of the changing economical environment on the capital structure of South African listed industrial firms

by

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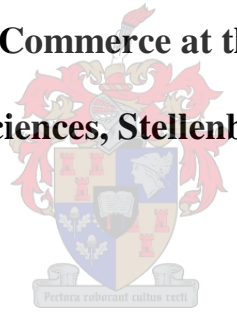

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ABSTRACT

The determinants of capital structure form an important part of the finance profession. Contemporary capital structure theory began in 1958 when Modigliani and Miller indicated that in a perfect capital market, the value of a firm is not influenced by its capital structure. However, when considering, inter alia, the effect of taxes, bankruptcy costs and asymmetric information, the value of a firm could be affected by its leverage.

Capital structure theory offers two contrasting capital structure models, namely the trade-off and pecking order models. According to the trade-off model, firms trade-off the costs and benefits of debt financing in order to reach an optimal capital structure. According to this model, a positive relationship exists between leverage and profitability. In contrast, the pecking order model indicates that firms use a financing hierarchy where internal funds are preferred above debt and equity usage. This model indicates a negative relationship between leverage and profitability. However, in practice, firms often deviate from these models to incorporate the benefits of the other model or to adapt to changing circumstances.

Firms' financing decisions may be influenced by both firm-specific and economical factors within the country where they are operating. Therefore, a firm's managers should consider the growth rate, interest rate, repo rate, inflation rate, exchange rates and the tax rate when conducting finance decisions, since these factors could influence the cost and availability of capital. In addition, these economical factors often have a significant influence on each other.

Prior capital structure research mainly focused on developed countries. However, South Africa provides the ideal environment to consider the effect of economic changes on capital structure within a developing country, due to South Africa's profound economic changes during 1994 and the years to follow. The primary objective of this study was thus to determine whether the capital structures of South African listed industrial firms are influenced by changes in the South African economical environment.

The effect of economic changes on capital structure was examined by using a TSCSREG (time-series cross-section regression) procedure. The regression model is based on a model developed by Fan, Titman and Twite (2008). One-period lags were

built into the model to make provision for the effect of economic changes that often only occur after some time. The study was conducted on a sample of firms listed on the industrial sector of the Johannesburg Securities Exchange (JSE Ltd) over the period 1989 to 2008.

The data, required to calculate the measures, were obtained from the South African Reserve Bank, the South African Revenue Service and the McGregor BFA database. This database contains standardised financial statements for both listed and delisted South African firms. In an attempt to reduce the possible skewing of results due to survivorship bias, both listed and delisted firms were included in the sample. In order to reflect its true nature, data should be available for consecutive years. Therefore, only firms with data available for more than five years were included in the final sample. The resulting sample consisted of 320 firms and 4 172 observations. The sample was also divided into years before and years after 1994, in order to determine the effect of the economic changes during 1994 and the years to follow on the firms' capital structures.

The results of this study indicated that some of the economic factors influenced the D/E ratio as well as each other. However, the effect of economic changes often only occurred after a lagged period. A strong relationship was indicated between the tax rate and the repo rate, which influenced the significance of the regression results. Support was found for both the trade-off and the pecking order models. The combined profitability variable ROA-ROE also had a significant effect on the other variables.

Based on these results, the claim that economic changes have an impact on capital structure is supported. The effect is often only indicated after a certain period. It also seems that the combination of the two capital structure models have a significant effect on leverage. Firms therefore appear to consider a combination of these models when conducting finance decisions.

OPSOMMING

Die determinante van kapitaalstruktuur speel ’n belangrike rol in die finansiële professie. Hedendaagse kapitaalstruktuurteorie het in 1958 tot stand gekom toe Modigliani en Miller aangedui het dat die waarde van 'n firma in 'n perfekte kapitaalmark nie deur kapitaalstruktuur beïnvloed word nie. Maar, wanneer die uitwerking van onder andere belastings, die koste van bankrotskap en asimmetriese inligting in ag geneem word, kan die waarde van 'n firma deur sy finansiële hefboomwerking beïnvloed word.

Kapitaalstruktuurteorie bied twee kontrasterende kapitaalstruktuurmodelle, naamlik die ruilmodel (*trade-off model*) en rangorde-model (*pecking order model*). Volgens die ruilmodel vergelyk firmas die kostes en voordele van finansiering met geleende kapitaal totdat 'n optimale kapitaalstruktuur bereik word. Hierdie model dui op die bestaan van 'n positiewe verband tussen hefboomwerking en winsgewendheid. In teenstelling hiermee dui die rangorde-model aan dat firmas 'n finansieringshiërargie gebruik waar interne fondse verkies word bo skuld en ekwiteit. Hierdie model dui 'n negatiewe verband aan tussen hefboomwerking en winsgewendheid. In die praktyk wyk firmas egter dikwels af van hierdie modelle om die voordele van die ander model te inkorporeer of om by veranderende omstandighede aan te pas.

Firmas se finansieringsbesluite kan beïnvloed word deur beide firma-spesifieke en ekonomiese faktore in die land waar hulle sake doen. Daarom moet 'n firma se bestuurders die groeikoers, rentekoers, inflasiekoers, wisselkoerse en die belastingkoers oorweeg wanneer hulle finansieringsbesluite neem, aangesien hierdie faktore moontlik die koste en beskikbaarheid van kapitaal kan beïnvloed. Hierdie ekonomiese faktore het dikwels ook 'n belangrike invloed op mekaar.

Vroeëre navorsing insake die kapitaalstruktuur het dikwels op ontwikkelde lande gefokus. Suid-Afrika bied egter die ideale omgewing om die uitwerking van ekonomiese veranderinge op kapitaalstruktuur in 'n ontwikkelende land te ondersoek as gevolg van Suid-Afrika se betekenisvolle ekonomiese veranderinge gedurende 1994 en die daaropvolgende jare. Die primêre doelwit van hierdie studie was dus om te bepaal of die kapitaalstruktuur van genoteerde Suid-Afrikaanse nywerheidsondernemings deur veranderinge in die Suid-Afrikaanse ekonomiese omgewing beïnvloed word.

Die uitwerking van ekonomiese veranderinge op kapitaalstruktuur is ondersoek deur gebruik te maak van 'n TSCSREG (tydreeks dwarssnit-regressie)-prosedure. Hierdie regressiemodel is gebaseer op 'n model wat deur Fan, Titman en Twite (2008) ontwikkel is. Enkeltydperk-vertragings is in die model ingebou om voorsiening te maak vir die uitwerking van ekonomiese veranderinge wat dikwels eers ná 'n tydperk sigbaar word. Die studie is uitgevoer op 'n steekproef firmas wat gedurende die tydperk 1989 tot 2008 op die nywerheidsektor van die Johannesburgse Sekuriteitebeurs (JSE Ltd) genoteer is.

Die nodige data om die metings te bereken is verkry van die Suid-Afrikaanse Reserwebank (SARB), die Suid-Afrikaanse Inkomstediens (SAID) en die McGregor BFA-databasis. Hierdie databasis bevat gestandaardiseerde finansiële state vir beide genoteerde en gedenoteerde Suid-Afrikaanse firmas. In 'n poging om die moontlike skeeftrekking van resultate as gevolg van die oorlewingsneiging te verhoed, is beide genoteerde en gedenoteerde firmas by die steekproef ingesluit. Data moet vir opeenvolgende jare beskikbaar wees om die ware aard daarvan aan te dui. Daarom is slegs firmas met data beskikbaar vir meer as vyf jaar in die finale steekproef ingesluit. Die steekproef het gevolglik 320 firmas en 4 172 waarnemings behels. Die steekproef is ook in jare voor en jare ná 1994 verdeel, om die uitwerking van ekonomiese veranderinge gedurende 1994 en die daaropvolgende jare op firmas se kapitaalstruktuur te bepaal.

Die bevindinge van die studie het daarop gedui dat sommige van die ekonomiese faktore die skuld/ekwiteit (D/E)-verhouding, maar ook elkeen van hulle beïnvloed het. Die uitwerking van ekonomiese veranderinge het egter dikwels eers ná 'n vertraagde tydperk sigbaar geword. 'n Sterk verhouding is aangedui tussen die belastingkoers en die repokoers, wat die betekenisvolheid van die regressieresultate beïnvloed het. Ondersteuning is gevind vir beide die ruilmodel en die rangorde-model. Die gekombineerde winsgewendheidsveranderlike ROA-ROE het ook 'n betekenisvolle uitwerking op die ander veranderlikes gehad.

Die bewering dat ekonomiese veranderinge 'n impak op die kapitaalstruktuur het, word ondersteun op grond van die bevindinge van hierdie studie. Die uitwerking daarvan word egter dikwels eers ná 'n tydperk sigbaar. Die gekombineerde kapitaalstruktuurmodelle het moontlik 'n betekenisvolle uitwerking op hefboomwerking. Dit wil dus voorkom of firmas 'n kombinasie van hierdie modelle oorweeg wanneer hulle finansieringsbesluite neem.

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TABLE OF CONTENTS

Page

Chapter 4: Research methodology

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION: BACKGROUND, OBJECTIVES AND OVERVIEW

1.1 Introduction

The determinants of capital structure have challenged academics and practitioners in the long run and it dominated the finance profession over the last few decades (Voulgaris, Asteriou & Agiomirgianakis 2002:1379). Capital structure theory has been characterised by the quest for an optimal capital structure. A trade-off between the costs and benefits of different financing methods is usually required for an optimal condition to exist (Shyam-Sunder & Myers 1999:219–221).

However, the method to determine an optimal capital structure, which is affected by the long-term finance used, is a central point in financial debate. When considering a capital structure model, different internal and external factors should be considered. These include, amongst others, the cost of the capital source, the impact of the financing method on the control of the firm and the risk attached to each financing source. Furthermore, the economical conditions within the country are also important. The most significant aspect to consider in the determination of a capital structure is its impact on the value of the firm as a whole (De Wet 2006:1–2).

Capital structure theory offers two opposing models: the trade-off model and the pecking order model. Both of these models are based on the Modigliani and Miller perfect capital market propositions, where the market value of a firm is independent of its capital structure and is determined by its ability to create profit (Voulgaris et al. 2002:1379–1380). However, subsequent literature has indicated that a firm's value can be influenced by the variation in its optimal debt and equity ratio (Drobetz & Wanzenried 2006:941).

Firm leverage is thus related to firm-specific characteristics, such as profitability, growth and size (Rajan & Zingales 1995:1451–1452) as well as external conditions, such as the constantly changing economical and political environment (Hough & Neuland 2007). The importance of the proposed research is to examine the significance

of the highly variable economical environment on South African listed industrial firms' capital structures over time.

The rest of this chapter is structured as follows. Firstly, a background sketch is provided. This is followed by the research question and objectives. Finally, the research methodology is presented.

1.2 Background to the study

Capital structure theory illustrates the quest for an optimal capital structure. Firms trade-off the costs and benefits of the various financing sources to determine their optimal debt-equity usage (Shyam-Sunder & Meyers 1999:219–221). Two contradicting capital structure models exist: the trade-off model and the pecking order model. These models are based on the Modigliani and Miller perfect capital market propositions, where the market value of a firm is determined by its ability to create profit. The trade-off model indicates a positive relationship between leverage and profitability, while the pecking order model indicates a negative relationship between these variables (Tong & Green 2005:2179–2182; Voulgaris et al. 2002:1379–1380).

Empirical research on capital structure appears to be mainly conducted within developed countries. An investigation of existing research showed that relatively few studies have so far focused on extensive capital structure research within developing countries, such as South Africa (Smart, Megginson & Gitman 2004:415; Booth, Aivazian, Demirgüç-Kunt & Maksimovic 2001:91). Since 1994, remarkable economic and political changes took place in South Africa, thus providing the ideal research environment within a developing country.

The following aspects will be considered:

- capital structure;
- the effect of leverage on profitability;
- the two capital structure models, namely the pecking order model and the trade-off model; and
- the effect of the changing economical environment.

1.2.1 Capital structure theory

Contemporary capital structure theory began in 1958 when Modigliani and Miller (M&M) published the proposed path-breaking article on capital structure (Kim 1978:45). The Modigliani and Miller study (1958) was based on a number of assumptions, namely that there are no taxes, no brokerage costs, no bankruptcy costs, that investors and corporations can borrow at the same rate, that all investors have the same information as management about the firm's future prospects, and earnings before interest and taxes (EBIT) are not affected by debt usage. If M&M's assumptions hold true, a firm's value is proved to be unaffected by its capital structure. The value of a leveraged firm will thus be the same as the value of an unleveraged firm (Brigham & Daves 2004:497).

In 1963, M&M relaxed their assumptions to develop a more realistic capital structure theory. They incorporated the effect of corporate taxes to take into account the tax deductibility of interest payments on debt financing. The value of a firm is thus affected by leverage, where the weighted average cost of capital (WACC) decreased as debt increased. The optimal capital structure would thus be nearly 100 percent debt financing (Brigham & Daves 2004:498; Brennan & Schwartz 1978:103).

In 1977, Miller published an article where he incorporated the effects of personal taxes. This article indicated that interest tax deductibility favours debt financing and the more favourable tax treatment of share income favours equity financing. Miller concluded that the presence of personal taxes reduces the advantages associated with debt financing, but does not eliminate it (Brigham & Daves 2004:499).

The optimal capital structure is defined as the combination of debt and equity that will maximise the value of the firm, if all other things are being held equal. The value of a firm is the present value of all the expected future cash flows that are going to be created by a firm's assets, discounted by its WACC (Erhardt & Brigham 2003:442). Therefore, the optimal capital structure is the combination of long-term finance sources that leads to the lowest capital cost and the highest firm value. By maximising the value of a firm, the share price and consequently the shareholders' wealth will be maximised in return (De Wet 2006:2). This is significant, since the primary objective of a firm's managers should be the maximisation of shareholders' wealth (Brigham & Houston 1998:22).

1.2.2 The effect of leverage on profitability

Modigliani and Miller (1958) stated that in the perfect market, the value of a firm is independent of its capital structure. When taxes (personal or corporate) are taken in consideration, the effect of leverage does have an effect on the firm's value, in relation to the firm's profitability (Voulgaris et al. 2002:1379). Profitable firms borrow more to benefit from tax savings because interest costs are tax deductible. Since highly leveraged firms can go bankrupt because of financial distress costs, firms with a high bankruptcy probability will have a low debt ratio. High debt costs wring the profitability of highly leveraged firms, which increase the possibility of bankruptcy. Firms thus depend on internal funds for expansion purposes, because external funds involve higher costs and risks. This suggests a negative relationship between profitability and capital structure (Pandey 2004:80–83). However, the two main capital structure models (the trade-off model and the pecking order model) indicate opposing relationships between leverage and profitability.

1.2.3 Capital structure models

Capital structure theory can be divided into three categories, namely tax-based, asymmetric and agency theories (Michaelas, Chittenden & Poutziouris 1999:114). Various capital structure models developed from these categories. Since this study focuses on economic conditions, such as taxes, two of these models are of importance to this study, namely the pecking order model and the trade-off model.

The pecking order model is based on the principle that asymmetric information exists, according to which managers are better informed than outside investors regarding promising opportunities inside the firm. This leads to a certain order in fund-raising. Firms prefer to use internally generated funds above debt and new equity issues. A financing decision hierarchy is thus formed, descending from internally generated funds, to debt and equity issues as a last resort. Equity is thus only issued after the firm had exceeded its debt capacity (De Wet 2006:8; Frank & Goyal 2003:237; Chirinko & Singha 2000:418).

According to the pecking order theory, a less profitable firm will be more willing to use external funds, such as debt and equity, if internal funds are insufficient. There thus exists a negative relationship between leverage and profitability. The use of debt decreases if profitability increases, since internally generated funds are then sufficient

for financing purposes. Based on this model, no optimal capital structure exists in the long run (Tong & Green 2005:2179–2182).

According to the trade-off model, a firm chooses the combination of debt and equity that balances the tax advantages of debt financing and the disadvantages of going bankrupt. The value of a leveraged firm can increase up to a point by using high debt levels, but thereafter the disadvantages of bankruptcy costs offset the tax advantages of using debt financing. By taking into consideration both the advantages and disadvantages of debt financing, the conclusion can be made that the firm's value is the highest when the WACC is at its lowest. The target capital structure under the trade-off model is therefore the combination of long-term finance sources that leads to the lowest WACC (De Wet 2006:4–7).

The trade-off model forecasts a positive relationship between leverage and profitability, where the use of debt increases if profitability increases (Tong & Green 2005:2182). An optimal capital structure is therefore established by trading off the costs, such as bankruptcy costs, and the benefits of debt financing, such as tax savings. According to empirical research, firms generally tend to move slowly towards this optimal capital structure (Titman & Tsyplakov 2005:1-2).

The trade-off model and pecking order model are not mutually exclusive. Firms can choose target leverage ratios based on the costs and benefits of debt financing as stated by the trade-off model, but they may deviate from their targets to incorporate the benefits of the pecking order model (Titman & Tsyplakov 2005:1).

1.2.4 The changing economical environment

The economical, political, legal and cultural environments of a country will mainly determine the potential costs and benefits of firms that operate within that country. A country's economic system can be defined as the structure and processes that the country uses to allocate its resources and accomplish its commercial activities. There exist three broad economic systems: the market economy, command economy and the mixed economy. In the *market economy*, the majority of a nation's productive facilities are privately owned, while the productive facilities of a nation is owned by government in a *command economy*, and the productive facilities are more equally distributed between private and government ownership in a *mixed economy*. South Africa has a

mixed economy where its citizens have a more equal input concerning the economy (Hough & Neuland 2007:119–123).

South Africa has a highly variable economic environment. Firms' managers should consider the economic conditions and evaluate the overall economic outlook over the long-term to determine the possible impact on their firms. Important economic factors that are of concern to firms are economic growth, inflation, the interest rate and the exchange rate (Hough & Neuland 2007:120).

Economic growth is defined as the increase in the capacity of an economy to produce products and services in the long run. The annual measure of economic growth is the percentage change in the real gross domestic product (GDP) of a country (Hough & Neuland 2007:132–134). GDP is the total market value of all the products and services produced in a country in a given year. It comprises the total consumer, government and investment spending added to the value of exports minus the value of imports (Blanchard 2006:46–50). Economic growth rates do not follow an even path; in fact, they tend to fluctuate from year to year (Hough & Neuland 2007:133). Slow growth has been associated with low investment, thus leading to a decrease in available financing sources to firms (Makgetla 2004:266).

The relevant cost of capital is a weighted average of the costs of equity and debt financing. The weights are the proportions of each financing source in the target capital structure (Modigliani & Miller 1963:441). The cost of debt financing is the interest rate payable on debt capital. The repo rate is the interest rate at which the South African Reserve Bank (SARB) indicates its short-term interest rates to the market through the cash amount offered at the daily tender for repurchase transactions. The repo system was introduced to ensure that interest rates react faster to changes in the financial markets (Aron & Meullbauer 2002:189–190; Smal & De Jager 2001:2–3).

Inflation is described as the progressive increase in the prices of products and services over time. It occurs when aggregate demand increases more rapidly than aggregate supply. One-way inflation is measured by the consumer price index (CPI) that indicates the price changes of all the products and services that the typical consumer buys. Inflation affects the interest rate as well as the general economic confidence in a country. High inflation tends to force the interest rate higher to enable investors to still achieve a sufficient return on their investments. It consequently increases the cost of

debt financing to firms. High interest rates, due to high inflation, normally reduces the domestic demand and consequently has an adverse effect on economic growth (Hough & Neuland 2007:136–138; Brigham & Daves 2004:934–935).

A country's exchange rate is determined by the demand and supply of its currency relative to the demand and supply of a foreign currency. It is thus the rate at which one currency is exchanged for another currency. The demand for a currency is mainly driven by foreign investments and the desire for foreign products and services. Consequently, the supply of a foreign currency is created by people's desire to sell their products and services (Hough and Neuland 2007:164). Exchange rate depreciation is the decrease in the price of the domestic currency in terms of a foreign currency, while exchange rate appreciation is an increase in the price of the domestic currency relative to the foreign currency (Brigham & Houston 1998:706). An exchange rate appreciation is often accompanied by an increase in capital inflows into the country. Firms will consequently have access to more foreign capital for financing purposes (Calvo, Leiderman & Reinhart 1993:109).

South Africa had difficulties concerning social unrest since World War II. Foreign investors considered the South African environment to be risky and uncertain, therefore leading to disinvestment in the country (Posnikoff 1997:76–78). During the 1980s, the pressure to end the apartheid regime intensified and multinational investors disinvested in South Africa, often due to sanctions. The presumed intent of using economic sanctions is economic interruption to force the government of the target country to change its political behaviour (Kaempfer & Moffett 1988). Firms can use funds generated within the firm or external funds borrowed from sources outside or within the home country. The disinvestment in South Africa lead to a decrease in foreign capital and available financing for firms were thus mainly retained earnings and domestic funds (Meznar, Nigh and Kwok 1994:1633; Hough & Neuland 2007:308–310).

After 1994, there was an increased inflow of foreign capital into the country. However, according to Padayachee (1995:163), recent experience and theories could not unambiguously support the view that foreign capital, used for debt financing, has made a significant contribution to long-term economic growth in developing countries, such as South Africa. According to him, domestic savings has been and will continue to be an important financing priority for developing countries. Bornschier, Dunn and Rubinson (1987) used cross-national data to determine the effects of foreign investment

on developing countries' growth and revealed that such investment increases the relative growth rate over the short term but decreases the relative growth rate in the long run. Kaempfer and Moffett (1988) also found that a decrease in foreign debt financing lead to slower economic growth.

Based on the preceding discussion it becomes apparent that South African firms operate within a highly variable economic environment. Changes in the economic environment could possibly influence the firms' long-term decisions.

1.3 Research question

In literature, the consensus is that leverage decreases or increases when different factors, such as economic growth, size and profitability impact on firms' capital structure decisions (Tong & Green 2005; Voulgaris et al. 2002; Rajan & Zingales 1995; Titman & Wessels 1988). Most empirical research on capital structure is conducted in industrial countries and only minor research is conducted in developing countries, such as South Africa (Booth et al. 2001:91). Due to the constantly changing economic environment, South Africa provides the ideal environment for capital structure research within a developing country.

The rationale for this study was to determine whether the changing economical environment has an effect on the capital structure of South African listed industrial firms.

1.4 Objectives

The primary objective of this study was to determine whether the capital structures of South African listed industrial firms are influenced by changes in the South African economical environment.

The secondary objectives were:

- to determine the nature of the relationship among the variables;
- to determine the long-term trend of the relationship; and
- to determine which capital structure model is followed by South African listed industrial firms.

1.5 Research methodology

1.5.1 Business Research Strategy

A combination of causal and descriptive research strategies was used. Causal research states that a change in one variable causes a predictable change in another variable (Coldwell & Herbst 2004:12). The purpose of descriptive research is to describe the characteristics of a population. It intends to answer "who, what, when and where" questions. The researcher already identified the underlying relationship(s) of the research problem (Coldwell & Herbst 2004:9–11). The aim of the combined research strategy was to determine the possible effect of the changing economical environment (the independent variable) on the capital structures of South African listed industrial firms (the dependent variable). The combined research strategy was advantageous, since it could provide the researcher with sufficient explanations for the population characteristics.

Quantitative research was used to determine whether a relationship exists between the different variables. This research approach describes, infers and resolves research problems by using numbers (Coldwell & Herbst 2004:15). Financial ratios were used to measure the firm's financial performance and capital structure. GDP, CPI, the repo rate, the R/$ exchange rate and the tax rate will be used to measure the economic changes.

1.5.2 Secondary data analysis

Secondary data analysis aims at re-analysing existing data, mostly quantitative data, in order to test hypotheses or to validate models (Mouton 2001:164). A number of academic publications were included in a comprehensive analysis of the existing literature on the research question. Different ratios were calculated for a sample of South African industrial firms that are listed on the Johannesburg Securities Exchange (JSE Ltd) between 1989 and 2008. These ratios were compared with the GDP, CPI, repo rate and the R/$ exchange rate between 1989 and 2008. The data, required to calculate the measures investigated in this study, was obtained from the McGregor BFA Database (2009), the South African Reserve Bank (SARB) and the South African Revenue Service (SARS) (2008).

1.5.3 The sample of the study

A population is defined as the group of people, items or units under investigation (Coldwell & Herbst 2004:73). Since the study's population was large, only a sample of the population was studied. There are two primary kinds of samples: the probability sample and the non-probability sample. They differ in the manner according to which the elementary units are chosen. The probability sample is based on the principle that every unit has a known, but not necessary equal chance to be selected. A non-probability sample is selected by using the judgement of the investigator. It is not possible to assess whether the sample is representative of the population or not (Coldwell & Herbst 2004:79). In this study, a *non-probability judgement sampling method* was used. Only firms that had been listed on the JSE Ltd over the period 1989 to 2008 were selected to form part of the sample.

The format of financial statements may vary amongst firms. Therefore, JSE Ltd data were used, since standardised financial statements are readily available. Although financial statement data were available for industrial, finance and mining sector firms, only industrial sector firms were considered. The reason for only considering industrial firms was due to the nature of the financial and mining industries that differs from that of the industrial sector. Firms in the same industry also often tend to have similar asset-to-liability ratios (Hatfield, Cheng & Davidson 1994:3).

Survivorship bias refers to the tendency to exclude failed firms from a study, since they no longer exist. Exclusion of these firms can causes a study's results to skew higher, since only firms that were successful enough to survive until the end of the study period were included (Pawley 2006:21). Therefore, in an attempt to reduce the survivorship bias, both listed and delisted firms were included in the sample for this study.

1.5.4 Hypotheses

The primary objective of this study was to determine whether a relationship exists between the capital structure of South African listed industrial firms and the changing economical environment. The following hypotheses were therefore formulated:

H_0: There is no relationship between the capital structures of South African listed industrial firms and the changing economical environment.

H_A: There is a relationship between the capital structures of South African listed industrial firms and the changing economical environment.

1.5.5 Data processing

The data was processed by using Excel, Statistica and SAS. Descriptive statistics, skewness, kurtosis, the Kolmogorov-Smirnov test, correlation analyses, regression analyses, the Mann-Whitney U test, and the split-middle technique were used to assess the relationship between the variables.

Descriptive statistics were used to determine the nature of the data set. Descriptive statistics included in this study consists of the mean (arithmetic average of all the items in the data set), median (central item in the data set), the data range (minimum and maximum values in the data set) and the standard deviation (positioning of a frequency distribution data set's values in relation to the mean) (Coldwell & Herbst 2004:103–104). *Skewness* and *kurtosis* are two other measures that can be used to identify outlier values and to provide descriptive information about a distribution (Jobson 1991). The Kolmogorov-Smirnov test was also used to determine the distribution of the data set.

Correlation analyses indicate whether the studied variables are positively or negatively related, as well as the relative strength of the relationship. However, it cannot be used to determine causation between variables. The two mainly used correlation analyses are the Pearson product moment correlation and Spearman rank-order correlation. The Spearman correlation was used in this study, since it relies on less assumptions and are less sensitive to outlier values than the Pearson correlation (Coldwell & Herbst 2004:107–109).

Regression analyses were used to predict the behaviour of one variable from the other. Multiple regression analyses entail the estimation of the dependent variable by more than one independent variable (Coldwell & Herbst 2004:109). A TSCSREG (time-series cross section regression) procedure was used based on a model used by Fan, Titman and Twite (2008). The procedure deals with panel data sets that consist of time series observations on each of several cross-sectional units (SAS 2009).

The non-parametric Mann-Whitney U test is often used to compare the sums of ranked data groups in order to determine whether the median values of two populations differ (Sheskin 2004:423; Motulsky 1999). In this study, the median debt to equity (D/E) values of all the firms between 1989 and 1994 were compared with the median D/E

values of all the firms between 1995 and 2008. The split-middle technique can be used to determine trends in data sets (Sharpe & Koperwas 2003:275–276). This technique was used to determine whether the trend in the median debt/equity (D/E) values before 1994 differed from the trend after 1994.

1.6 Orientation

This study consists of the following six chapters.

Chapter 1: Introduction: background, objectives and overview

This chapter contains a broad overview of the study. It provides a background sketch to the study, formulates the research problem and primary and secondary objectives as well as the hypotheses. It also indicates the research methodology used to test the hypotheses.

Chapter 2: Capital structure theory

The focus of this chapter is to provide a broad overview of capital structure theory and profitability concepts.

Chapter 3: The effect of the economic environment and economic variables on capital structure

This chapter provides a discussion of the South African economical environment and the impact of economic growth, the interest rate, inflation and the R/$ exchange rate on firms' decision-making.

Chapter 4: Research methodology

The focus of this chapter is to provide an overview on the research processes, approaches and statistical methods used to test the hypotheses.

Chapter 5: Empirical results

The findings of the empirical research are presented in Chapter 5. These findings refer to the relationship between the changing economical environment and the capital structure of South African industrial firms that are listed on the JSE Ltd over the period 1989 to 2008.

Chapter 6: Summary, conclusions and recommendations

In this chapter, conclusions are drawn, based on the findings of the research results. Recommendations are also made regarding the implications of these results. Limitations of the study are indicated and possibilities for future research are identified.

CHAPTER 2

CAPITAL STRUCTURE THEORY

2.1 Introduction

Finance consists of three interrelated areas, namely investments that focus on the decisions made by investors when they choose their investment portfolios; money and capital markets which deal with financial institutions and security markets; and financial management that involves decisions within firms. Financial management emerged as a separate study field in the early 1900s. A movement towards theoretical analysis was seen during the 1950s. The focus was placed on managerial decision-making concerning the firm's choice of assets and liabilities. The goal was the maximisation of the firm's value (Brigham & Houston 1998:4–6).

Financial management is thus very important to firms, since it explains how managers can increase their shareholders' value. Investors are increasingly forcing firms' managers to focus on value maximisation (Brigham & Daves 2004:2). Shareholders are the owners of the firm. They elect directors who hire managers to manage the firm on their behalf. The primary goal of managers should be shareholders wealth maximisation, which entails that the market price of the firm's common shares should be maximised, *ceteris paribus* (Brigham & Houston 1998:14; Rotemberg & Scharfstein 1990; Grossman & Stiglitz 1977:389).

Two important financial issues can thus arise from the interrelated finance areas. The first issue entails which investments a firm should consider, and the second issue involves the firm's financing choices in order to obtain an optimal capital structure where shareholders wealth will be maximised. Capital structure theory and the two main capital structure models are discussed in this chapter. The theory is essential to understand the reasoning behind firms' capital structure decisions. Prior capital structure research will also be discussed, depending on its relevance to this study.

The remainder of this chapter consists of ten sections. Shareholders wealth maximisation, which should be the primary objective of a firm's managers, is discussed in section 2.2. The finance and investment decisions stem from this objective. In section

2.3 capital structure theory is explained according to the capital structure basis provided by Modigliani and Miller. The importance of corporate income tax, bankruptcy costs and asymmetric information are indicated in sections 2.4 to 2.6. These determine the costs and benefits of the different financing methods. The relationship between firm leverage and profitability is discussed in section 2.7. There are difficulties concerning the interpretation of the leverage-profitability relationship. An increase in profitability can lead to an increase in leverage for some firms and a decrease in leverage for other firms. This notion is consistent with the two capital structure models, namely the pecking order model and the trade-off model. These two models are described in section 2.8, by using market-to-book ratios. Dual debt and equity issues are also discussed. Section 2.9 demonstrates the saucer-shaped relationship between leverage and profitability, due to the two capital structure models. In section 2.10, the firm and industry characteristics are discussed, indicating that capital structure research is mainly conducted within developed countries. Developing countries have the tendency to use more equity financing. The final section (2.11) is a summary on capital structure theory and its most important determinants.

2.2 Shareholders wealth maximisation

The primary objective of a firm's managers should be maximisation of the shareholders' wealth and consequently the maximisation of the firm's common share prices. There are different factors that influence share prices, and there are different actions that managers can take in an attempt to maximise the firm's share price. It is important to note that a financial asset, including a firm's shares, is only valuable to the extent that such asset generates cash flow. The timing of the cash flow is also important, since received cash can immediately be reinvested. Investors are normally risk averse and they will be willing to pay more for shares with a relatively certain cash flow. Managers can thus enhance the firm's value by increasing the firm's expected cash flow and reducing the firm's riskiness (Brigham & Houston 1998:22).

Managers make investment and financing decisions within the firm. The investment decision entails the products and services that should be produced. The finance decision involves the combination of debt and equity that the firm should use (Brigham & Houston 1998:22). Part of the firm's financial decisions thus entails the choice of a specific capital structure. The capital structure choice is important, since it will

determine the weights of the different capital sources and it will thus have an influence on the firm's cost of capital (De Wet 2006). Consequently, capital structure theory will be discussed in the next section.

2.3 Modigliani and Miller's capital structure theory

Modigliani and Miller (M&M) are widely considered the pioneers of capital structure theory. They have provided the foundations for studying the effects of financial structure on firm valuation in perfect market equilibrium, with symmetric information and no taxes and bankruptcy costs (Brigham & Daves 2004; Bradley, Jarrell & Kim 1984:857; Kim 1978:45). A number of authors considered M&M's theory while conducting capital structure research (Baker & Wurgler 2002:25; Myers 2001:85; Barnea, Haugen & Senbet 1981:7; Brennan & Schwartz 1978:103; Haugen & Senbet 1978:383).

M&M published their first article on capital structure theory in 1958. It demonstrated the irrelevance of capital structure to the firm's value in a perfect capital market (Modigliani & Miller 1958). Their work provided a consistent proof that, given unfettered arbitrage opportunities, no bankruptcy possibilities and no corporate taxes, the total firm value is not affected by debt usage (Scott 1976:33). In the M&M perfect capital market, there is no gain from opportunistically switching between debt and equity, because the costs of the different forms of capital do not vary independently (Baker & Wurgler 2002:28–29). The total value of the firm thus remains constant across all degrees of financial leverage (Kim 1978:45).

According to Kim (1978:45), a firm's degree of financial leverage does not have an impact on its value. However, the possible impact of a firm's leverage on the combined cost of the different capital sources should also be considered. The relationship between the weighted average cost of capital (WACC) and different levels of leverage, in the absence of bankruptcy cost and taxes, is indicated by Figure 2.1.

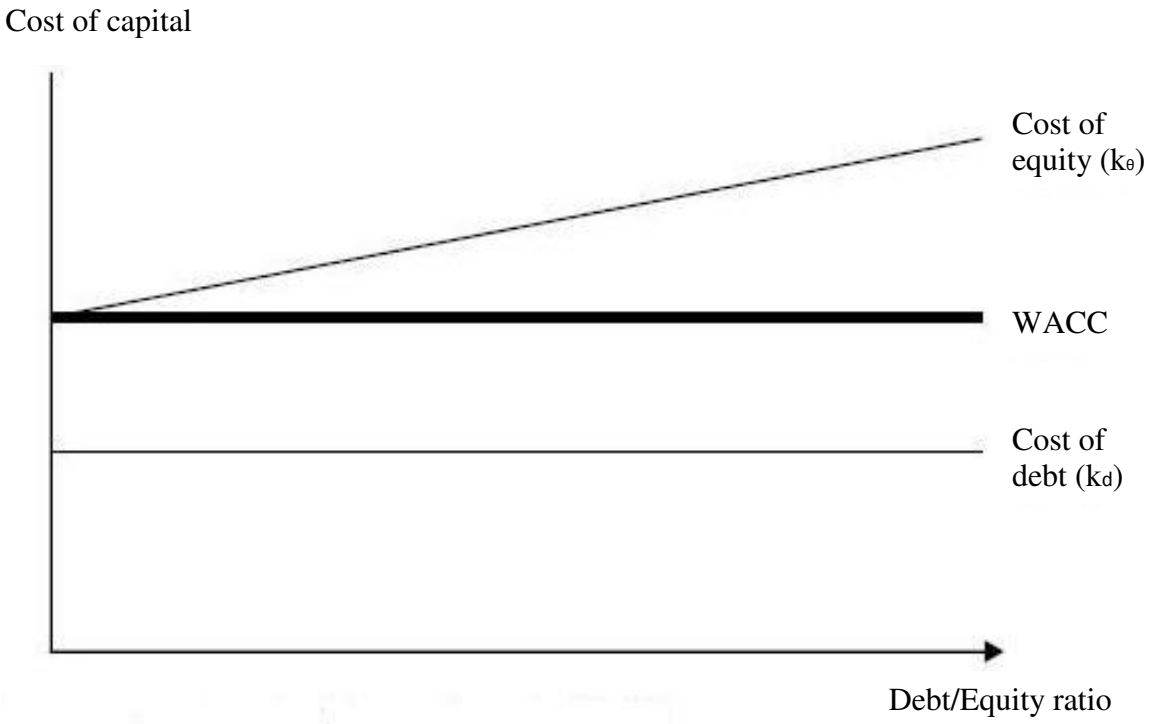

Figure 2.1: WACC for different leverage-levels without taxes and bankruptcy costs

Source: De Wet (2006:5)

Figure 2.1 illustrates that the cost of equity (k_e) increases as the debt-equity ratio increases. However, the WACC stays the same for different levels of financial leverage. The reason for this tendency is that the increase in WACC due to the increase in k_e is completely offset by the decrease in WACC because of the greater weight given to the cheaper cost of debt (k_d). The firm's overall cost of capital is thus unaffected by its capital structure (De Wet 2006:4–5).

Some researchers do not agree with M&M's perfect capital market theory. Myers (2001:85) stated that M&M's propositions are, as a matter of theory, controversial. He compares the M&M perfect-market propositions to a hypothetical perfect-market supermarket, where the value of a pizza does not depend on the way it is sliced. The M&M theory then becomes questionable, because the value of a pizza does in fact depend on the way it is sliced. Consumers will be willing to pay relatively more for several slices than for the whole unit. The M&M propositions thus only serve as capital structure guidelines.

If the assumption of a perfect capital market with symmetric information and no taxes and bankruptcy costs is relaxed, the capital structure theory should consequently be altered. The effect of these factors on capital structure theory is therefore discussed in the following sections.

2.4 The importance of corporate income tax to capital structure theory

An analysis of the effect of corporate income tax on capital structure is important, not only since corporate income tax does in fact exist, but also because the M&M analysis seems to lead to the conclusion that an optimal capital structure will consist almost completely of debt. It can be a troublesome conclusion, since the optimal capital structure of firms varies in practice and does not necessarily consist of 100% debt financing (Brennan & Schwartz 1978:103).

M&M correctly account for the effect of corporate taxes in their later 1963 article, proving that debt financing increases the value of the entire firm. In the article, they stated that the inclusion of taxes effectively amounts to a government subsidy, due to the effect of the subsidy on the interest payable on debt financing (Haugen & Senbet 1978:383). Interest payments to lenders are usually fully tax deductible, while dividend payments to shareholders are not. Tax systems therefore generally encourage the use of debt rather than equity financing. When the corporate tax rate rises, the expectation is that it will lead to a consequential increase in a firm's debt usage. Firms will consequently attempt to maximise their debt usage (Desai, Foley & Hines 2004:2453–2454; Kim 1978:45).

In the presence of taxes, the M&M theorem thus implies the near exclusion of equity financing. The prediction is that the optimal capital structure will consist almost entirely of debt financing, or that a nearly infinite debt-equity ratio will exist. This implication is problematic, since an infinite debt-equity ratio is contradictory with both common sense and established practice (Haugen & Senbet 1978:383; Scott 1976:33).

Even M&M did not advocate the total exclusion of equity financing. They argued that a number of considerations outside their model render such a strategy inappropriate (Scott 1976:34–35). The inconsistency between the predictions of the M&M model and the observed reality of the income tax effects, where retained earnings may be a cheaper

finance source than debt, should be considered. According to M&M, the theoretic inconsistency is not fully comprehended within their framework of a static equilibrium model (Brennan & Schwartz 1978:103–104).

The general result from various capital structure studies is that the combination of the tax advantages of debt financing and the leverage-related costs, generates an optimal capital structure below 100% debt financing. The reason for this tendency is that the tax advantage of debt financing is traded off against the probability of going bankrupt (Michaelas et al. 1999:113).

2.5 Bankruptcy costs and capital structure

Myers (1984:579) indicated that it is difficult to classify firms according to their tax status without implicitly also classifying them in terms of other elements, such as the threat of going bankrupt. Firms with large tax losses carried forward may be in financial distress. Such firms usually have high debt ratios, because they cannot currently utilise the tax deductibility of interest (Michaelas et al. 1999:120). However, the presence of bankruptcy costs acts to alleviate such firms' amount of debt financing. An optimal debt-to-equity ratio can be reached, where the tax benefits of increased debt financing are traded off against the increasing bankruptcy possibility (Strebulaev 2007:1749; Ross 1977:24).

A number of authors have noted that the existence of bankruptcy costs may offer a rationale for the existence of an optimal capital structure (Kim 1978:46; Scott 1976:34–35). The expectation is that firm managers acting on behalf of shareholders will choose the capital structure that will maximise the firm's value (Israel 1991:1397). Scott (1976:33) introduced a capital structure model that included bankruptcy costs and implied that an optimal debt-equity ratio can exist. The optimal ratio results from a trade-off between the possible bankruptcy costs and the tax savings associated with interest tax deductibility. The optimum debt usage is reached when the present value of the bankruptcy costs is balanced against the interest tax advantage of debt financing (Bradley et al. 1984:857; Haugen & Senbet 1978:383–384).

Brennan and Schwartz (1978:104) argued that once a firm goes bankrupt, the interest tax savings will come to an end. When this possibility is recognised, it is evident that additional debt usage will have two effects on the firm's value: it will increase the

realised tax savings as long as the firm survives and, alternatively, it will reduce the probability of the firm's survival for any particular period. Depending on which of these conflicting effects succeeds, the firm's value may increase or decrease with the issuance of additional debt (Brennan & Schwartz 1978:104).

The general assumption is that when additional debt is issued from a small base, the firm's survival probabilities will not be considerably affected. The tax effect outweighs the bankruptcy possibility and the firm's value will increase. However, if the firm has a high initial debt level, further debt additions may have a negative effect on the firm's value and survival probabilities (Brennan & Schwartz 1978:104).

2.6 The effect of asymmetric information

The introduction of private information modelling resulted in a number of theories that can possibly explain capital structure. In these theories, firm managers or insiders are supposed to hold private information on the characteristics of the firm's investment opportunities or returns (Harris & Raviv 1991:306). The firm's choice of capital then acts as a signal to outside investors of the information held by the firm's insiders (Michaelas et al. 1999:116).

Informational asymmetry does not imply that firms' insiders have more or superior information than market outsiders. The assumption is that firms' insiders have certain information that is useful but unavailable to the market. The market can thus not identify the real nature of a project and is therefore unable to distinguish a profitable project from a less profitable project (Barnea et al.1981:9).

Capital structure is influenced by asymmetric information, because it may limit access to external financing. Equity issues are interpreted as a negative signal, since managers usually issue equity when the share price is overvalued. Empirical observations have shown that the announcement of new equity issues normally lead to a decline in share prices. Therefore, equity issues are reasonably rare among established firms (Baskin 1989:27).

According to Myers (1984:585), the decision rule is to issue debt when investors undervalue the firm, and to issue equity when they overvalue the firm. Baskin (1989:27) states that asymmetric information does not only have an impending effect on a firm's ability to raise funds through new share issues. Such information also creates an

imperfectly elastic supply of equity funds by restraining access to retained earnings, since dividends provide signals both to current and future earnings.

The main conclusion from the asymmetric information theory is that firms finance their capital needs in a hierarchical manner. They first use internally available funds, then debt financing, and they only issue equity as last resort. This preference is consistent with the differing costs and information revealed by the financing sources (Michaelas et al. 1999:116).

Changes in a firm's profitability or firm value may also influence its financing decisions (Goldstein, Ju & Leland 2001:483). The relationship between profitability and a firm's debt-equity ratio is therefore discussed in the next section.

2.7 Profitability

Capital structure models often assume that the decision of how much debt to issue is a static choice. However, in practice, firms adjust their outstanding debt levels in response to changes in their profitability or firm value (Goldstein et al. 2001:483). Profitability can be defined as earnings before interest, depreciation and taxes, divided by total assets (Baker & Wurgler 2002:8). Myers (2001:87) found that the debt capacity of a firm depends on its future profitability and firm value. The firm may increase its borrowing if profitability increases. However, the firm can also be forced to decrease its debt usage if the firm struggles to meet its financial obligations due to a decrease in its profitability.

According to Kayhan and Titman (2007:2), recent finance literature frequently gives the impression that a firm's history is a very important determinant of the firm's current capital structure. The results of their study indicated that a firm's recent profit history has a more significant effect on its capital structure decisions than its distant history. The suggestion is that part of the historic profitability effect reverses in the future to prevent the firm from moving too far away from its target debt ratio (Kayhan & Titman 2007:19–20). Titman and Wessels (1988:6) and Baskin (1989:33) also indicated that firms with higher past profitability have a propensity to have lower debt ratios. In addition, Baker and Wurgler (2002:15) noted that high historical market valuations are related to low leverage.

Established, profitable firms often seem to use debt financing too “conservatively”. Consequently, their leverage ratios appear to be very low (Strebulaev 2007:1747). The

reasoning behind this tendency is that firms with a high earnings and profitability rate have the ability to finance their activities with internally generated funds. High profitability thus provides firms with the ability to replace debt financing with internally generated funds. The firms will then have a lower debt-equity ratio (Baker & Wurgler 2002:8; Barton & Gordon 1988:625; 630).

According to Myers (2001:89), there are many established, profitable firms that operate at low debt levels for years (Microsoft, for example). Studies of the determinants of debt ratios consistently found that the industry's most profitable firms are also those firms that tend to borrow the least. Low profits thus usually result in higher debt levels and vice versa (Myers 2001:89).

The conclusion can thus be made that profitable firms will reduce their leverage relative to less profitable firms. However, Kayhan and Titman (2007:16) found that in market regressions, cumulative profitability has a positive estimation coefficient concerning the leverage ratios. Their result is incompatible with the notion that firms decrease their debt usage when they are more profitable. A probable explanation for this finding is that very profitable firms also have higher share returns, and their debt ratios then tend to decline accordingly. However, highly profitable firms' debt ratios tend to decline less than the debt ratios of not so profitable firms with high share returns. The reasoning is that highly profitable firms have a propensity to invest more, and they have consequently less cash available to pay down their debt (Kayhan & Titman 2007:16).

There are difficulties concerning the interpretation of the leverage-profitability relationship. In some firms, an increase in profitability leads to an increase in leverage. However, in other firms leverage decreases when profitability increases. The reasoning behind this contradiction is that different firms follow different capital structure models. The relationship between leverage and profitability thus depends on the capital structure model that a firm uses (Strebulaev 2007:1749–1750).

2.8 Capital structure models

Since the ground-breaking work of M&M in 1958, a vast amount of empirical studies have been conducted with the objective to determine the explanatory factors of capital structure (De Miguel & Pindado 2001:77–78). Capital structure theory implies that

firms have a target debt ratio, which is determined by the trade-off between the benefits and costs of equity and debt financing (Kayhan & Titman 2007:1–2).

Capital structure theory can be classified into three categories, namely tax-based, asymmetric and agency theories. Different capital structure models developed out of these capital structure categories (Michaelas et al. 1999:114). Since the current study focuses on economic conditions such as taxes, two of these models are important to the study, namely the trade-off and the pecking order models.

2.8.1 The trade-off theory

Previous empirical literature on the determinants of firms' financing decisions has a tendency to focus on the static trade-off capital structure theory (Ozkan 2001:177). The trade-off theory assumes that the optimum debt level is the result of the trade-off between the tax advantages of debt financing and the possibility of going bankrupt (De Miguel & Pindado 2001:77–78). Tax-based theories normally argue that capital structure decisions are primarily influenced by tax and bankruptcy considerations (Michaelas et al. 1999:114).

Modigliani and Miller (1958) stated that capital structure is irrelevant in efficient, perfect capital markets. The trade-off theory adds imperfections to M&M's perfect capital market theory. These imperfections include the existence of taxes and bankruptcy costs, while M&M's assumptions of market efficiency and symmetric information are maintained. The results of the added imperfections are that higher taxes on dividends may lead to higher debt usage, while higher non-debt tax shields may lead to less debt financing. An increase in bankruptcy costs normally causes a decrease in debt financing and a consequent increase in equity issuing. This tendency leads to the development of an optimal capital structure (Baker & Wurgler 2002:25).

Trade-off theories are based on the concept of a target capital structure that balances the different costs and benefits of equity and debt financing (Myers 1984:577). Kayhan and Titman's study (2007:27) supports the concept that firms move towards a target debt ratio. Myers (2001:87) noted that the tax advantage of debt financing can be partly offset by the tax advantage of equity to the firm's individual investors. The tax advantage takes the form of a capital gains deferment and consequently lowers the present value of capital gains taxes.

The trade-off theory thus indicates that the tax advantages and bankruptcy disadvantages of debt financing will be balanced in order to reach a target capital structure. Figure 2.2 illustrates the relationship between these different components of the trade-off theory.

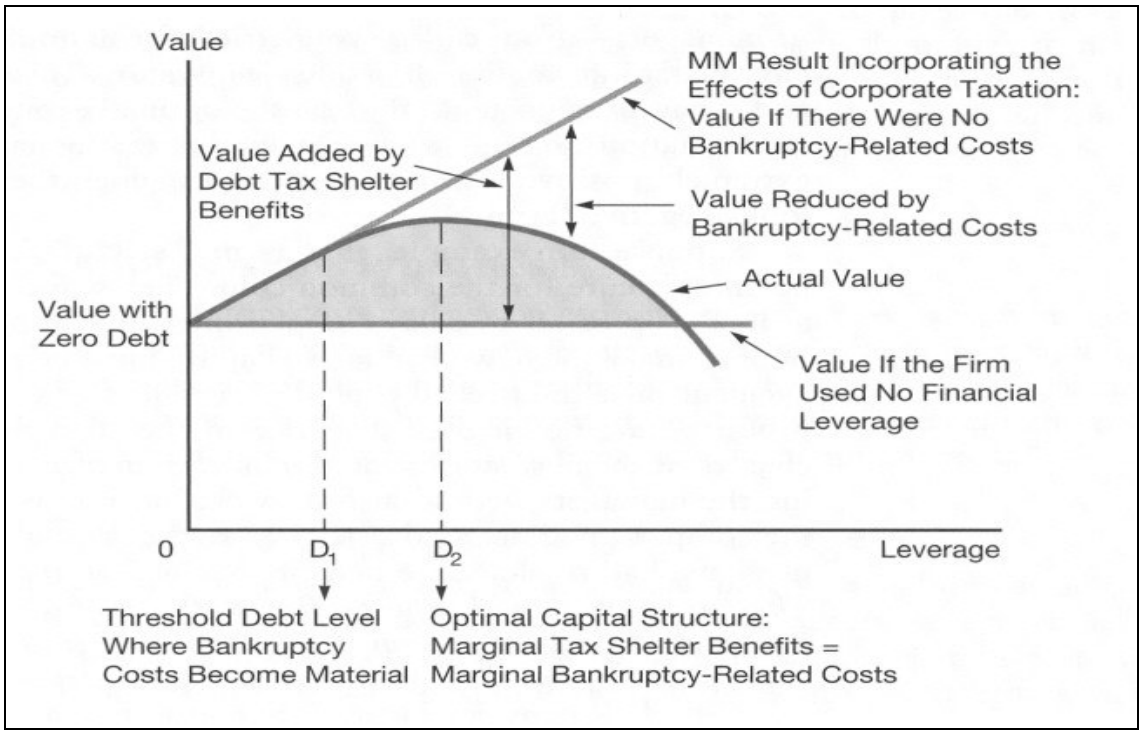

Figure 2.2: The trade-off theory

Source: Brigham & Daves (2004:501)

In Figure 2.2, the trade-off between debt and equity financing is indicated. The firm's value under all equity financing adjusts to allow for debt financing, until an optimum capital structure is reached (Myers 1984:577–578). Debt is relevant due to the existence of tax and bankruptcy costs (Michaelas et al. 1999:113). The tax benefits of an increase in debt financing are balanced against an increase in possible bankruptcy costs, until an optimal debt-equity ratio is reached (Myers 2001:88–89; Ross 1977:24).

The trade-off theory implies a target-adjusted capital model, where firms progressively adjust towards a target debt ratio (Hovakimian, Opler & Titman 2001; Myers 2001:93). A survey conducted by Correia and Cramer (2008:46) indicated that only 21% of the observed South African listed firms at that stage did not apply some form of target debt-equity ratio.

However, the notion of a target debt ratio is disputable. It is intuitively believed that the trade-off between the benefits and costs of debt financing will lead to an optimal capital structure. On the other hand, it is possible that the relation between the debt ratio and the firm's value can be relatively weak at the optimum level. The cost of deviating from this optimum level will then be reasonable small, making the notion of a target debt ratio less important (Kayhan & Titman 2007:27).

The results of a study conducted by Kasozi and Ngwenya (2009:21–23) indicated that the trade-off capital structure model explained the financing behaviour of consistently listed Johannesburg Securities Exchange (JSE Ltd) firms over the period 1995 to 2005. However, they also observed a division between capital structure theory and practice, since empirically tested models and the determinants of capital structure choices did not seem to fully explain the financing behaviour of listed JSE Ltd firms.

In practice, firms often deviate from their target capital structure. Goldstein et al. (2001:484) indicated that a firm's management will initially choose to issue a smaller amount of debt than predicted by their target capital structure, if they have the option to increase their debt levels in the future. In general, firms that periodically adjust their leverage will occasionally depart from their optimal leverage ratio to incorporate the benefits of additional debt financing (Strebulaev 2007:1760).

Interest on debt financing shields the firm's income from taxation. Profitable firms with less non-debt tax shields should thus use more debt financing than less profitable firms. The expectation is that tax-paying, profitable firms will substitute equity with debt until the bankruptcy possibility, due to the increase in debt, becomes a threat to the firm (Michaelas et al. 1999:114; Wiwattanakantang 1999:372). The results of the study by Fischer, Heinkel and Zechner (1989:32) imply that firms with low bankruptcy costs have higher leverage ratios, compared to firms with very high bankruptcy costs that experience lower leverage ratios.

Less profitable firms also present lower returns to shareholders. An increase in leverage leads to an increase in borrowing costs and bankruptcy risks and it may consequently lower shareholders' returns even further. Low shareholders' returns then limit equity issuing. An unprofitable firm will thus avoid external financing as far as possible. Financial institutions will also be reluctant to provide capital to a firm that is struggling

financially. This tendency reflects a positive relationship between profitability and leverage (Tong & Green 2005:2182).

A number of researchers support the notion of a positive relationship between profitability and leverage. Strebulaev (2007:1769) found a positive correlation between leverage and profitability at the refinancing point. Harris and Raviv (1991:312) also stated that there is a positive relation between the debt-equity ratio and profitability. If profitability thus increases, the firm's debt usage may also increase. The static trade-off theory can therefore not account for a negative relationship between profitability and leverage. Another capital structure model is accountable for the existence of such a relationship, namely the pecking order model.

2.8.2 The pecking order theory

According to the asymmetric information theories, firm insiders or managers possess private information that outsiders do not have access to. The firm's choice of capital then serves as a signal to outside investors, indicating the information held by insiders (Wiwattanakantang 1999:372). The most important asymmetric information theory is the pecking order theory, which introduces a hierarchical finance structure (Michaelas et al. 1999:116). According to this financing structure, firms prefer to use internally generated funds, followed by debt and as last resort, when firms have no more debt capacity, equity will be issued (Baker & Wurgler 2002:26; De Miguel & Pindado 2001:80; Michaelas et al. 1999:116; Wiwattanakantang 1999:372).

This hierarchical structure reflects the relative information and costs of the different financing sources (Michaelas et al. 1999:116). Internal funds are regarded as being cheaper than debt financing and free of outside interference. Debt is considered as being cheaper and less restricted than the issuing of new equity. Equity is issued as a last resort, since it often conveys negative signals to the market (Voulgaris et al. 2002:1380–1382).

Firms tend to avoid new equity issues since it sends a negative signal to the market, indicating that the share price is overvalued. Firms' managers thus prefer to keep surplus cash balances for investment purposes, instead of issuing equity (De Wet 2006:8–9). According to Myers (1984:585), the “financing decision rule” is to issue debt when investors undervalue the firm, and to issue equity if they overvalue the firm.

De Miguel and Pindado (2001:92) stated that firms with the capacity to generate funds internally use these funds instead of debt financing. Managers who aim to maximise market value and who possess better information than outside investors will thus avoid external financing as far as possible (Myers 2001:93). Established firms usually avoid equity issues. Debt financing then tends to be the difference between the established firms' desired investments and the moderately inelastic supply of retained earnings (Baskin 1989:26).

The pioneering work of Myers and Majluf (1984) revealed that if investors are less informed than firm insiders about the value of the firm's assets, it may lead to the mispricing of equity by the market. When a new project requires equity financing, the effect of under-pricing may be so serious that new equity investors capture more of the net present value (NPV) of the new project, which can result in a net loss to the firm's existing shareholders. The project will then probably be rejected, even if the NPV is positive. This can be avoided if the firm can finance the project by using a security that is not undervalued by the market (Harris & Raviv 1991:306).

No undervaluation is involved when the firm uses internal funds and low-risk debt to finance its projects. In the situation of undervaluation, internal funds as well as low-risk debt will thus be preferred to equity. The pecking order theory leads to the notion that capital structure will be driven by firms that strive to finance their new investments with internal funds, then with low-risk debt and only on last resort, by equity (Harris & Raviv 1991:306). The underinvestment problem decreases after information announcements such as earnings announcements and annual reports. Firms that issue equity, tend to gather their equity issues after this information is released (Harris & Raviv 1991:308).

Firms that choose to use equity funding will have less expensive funding sources, such as debt, available for future use. If firms choose to use debt as their current form of financing, they will tend to have only more expensive funding sources available for future usage. If a firm thus has high levels of net organisational capital (the difference between the value of the firm's assets and its liabilities), it should be mainly equity financed and hold relatively large cash balances (Barton, Hill & Sundaram 1989:37). Goldstein et al. (2001:484) also stated that a firm's management will choose to issue a smaller amount of debt initially, if they have the option to increase their debt levels in the future.

Taxes and transaction costs can also motivate the use of the pecking order model. The direct costs of using retained earnings as a financing source may be less than the costs involved when issuing new equity. There are several reasons for this tendency. Firstly, a firm can save on investment banking fees. Secondly, transaction costs are normally lower for debt than for equity transactions. Thirdly, a firm can also reduce its taxable dividends if it limits its equity issues. It is therefore logical for firms to limit new equity issues. The impact of tax and transaction costs will motivate firms to prefer internally generated funds above externally generated funds, and to prefer debt to equity. Debt financing also has the advantage of avoiding corporate income taxes. The costs of new equity issues may thus be large compared to the cost of debt financing (Baskin 1989:27).

According to the pecking order theory, there is no optimal capital structure. If there was a hypothetical optimum, the cost of deviating from this optimum is not worth mentioning in comparison to the cost of raising external financing. External equity financing is expensive to raise, since outside investors realise that managers and firm insiders may have better information regarding the firm's prospects. Outside investors reasonably discount the firm's share price when the firm issues equity instead of debt. In order to avoid this discount, managers avoid the issuing of equity as far as possible. Firms retain profits in the absence of investment opportunities. They use these retained earnings to build internal financial capacity in order to avoid future external financing as far as possible (Baker & Wurgler 2002:26). Profits are usually taken into account when measuring the firm's capacity to generate funds internally (De Miguel & Pindado 2001:80).

Friend and Lang (1988:275–277) found that profitability is negatively related to leverage. The notion is thus that more profitable firms should use less debt financing. They will then consequently have a smaller debt ratio. Ozkan (2001:190–191) stated that the current profitability of a firm has a negative effect on a firm's borrowing decisions. Israel (1991:1403) revealed that higher debt levels have the outcome of lower profitability, thus indicating a negative relationship between the two variables.

A study done by Wiwattanakantang (1999:393) revealed that the relationship between profitability and leverage is negative. His results thus support the notion of the pecking order theory that highly profitable firms prefer internal financing. Low profit firms use more debt financing, because their internal funds are not sufficient. The results of a

study done by Baskin (1989:29) on 378 firms from the 1 960 Fortune 500 survey indicated that a permanent increase of 10% in profitability will result in a decrease of 20% in a firm's debt ratio. Drobetz and Wazenried (2006:952–953), Tong and Green (2005:2187), Voulgaris et al. (2002:1382), Ozkan (2001:178) Rajan and Zingales (1995:1475), Barton et al. (1989:42–43), Barton and Gordon (1988:629) and Titman and Wessels (1988:14–15) all found a negative relationship between profitability and debt levels. There is thus strong empirical support for the notion that there is a negative relationship between the debt and profitability ratios of firms, as stated by the pecking order model.

2.8.3 Capital structure theories and market-to-book ratios

According to Kayhan and Titman (2007:6), firms with high market-to-book ratios are subject to less asymmetric information problems and therefore more willing to issue equity. These firms also tend to have lower target debt ratios and are consequently more likely to issue equity and less likely to issue debt (Hovakimian, Hovakimian & Tehranian 2004:520). The main finding of Baker and Wurgler's (2002:2) research was that low-leverage firms raised funds when their market valuation (measured by the market-to-book-ratio) was high, while high-leverage firms raised funds when their market valuation was low.

The trade-off theory predicts that firms will have target capital structures. A seminal forecast of the trade-off theory is that a firm's capital structure will eventually adjust to changes in the firm's market-to-book ratio. The adjustment allows firms to move back slowly towards their target ratios (Kayhan & Titman 2007:27; Baker & Wurgler 2002:25).

According to Myers (2001:93), a low target debt ratio is not the rationale behind the tendency that highly profitable firms borrow less. In the pecking order model, there is no target debt ratio. The reasoning behind the preference for internal funds above external funds is that profitable firms have sufficient internal financing sources. Less profitable firms have less internal financing available. They thus have to use external financing sources. A firm can also use dual debt-equity issues to finance its activities (Hovakimian et al. 2004). The “dual issuing” is discussed in the following section.

2.8.4 Dual debt and equity issues

Hovakimian et al. (2004:519) examined dual equity and debt issues. Dual issues involve the simultaneous issuing of equity and debt financing. Dual issues can result in considerable changes in the issuing firm's capital structure. If the maintenance of a target debt ratio is important, firms should use a financing source that offsets any accumulated deviation from their target. Dual issues have a less leverage-increasing effect than debt issues but a higher leverage-increasing effect than equity issues, *ceteris paribus*. Hovakimian et al.'s (2004:528) results indicated that the average dual issue relates to 61.5% of the pre-issue value of the investigated firms' total assets. It is almost double the size of an average equity issue and more than triples the size of an average debt issue according to them.

The trade-off theory implies that firms will probably increase their leverage if their profitability increases. Firm leverage and profitability is thus positively related (Tong & Green 2005:2182). In contrast, according to the pecking order model, low profitability increases the probability that internal funding sources will not be efficient. External financing will then be required to finance the firm's activities. The issuance of external capital is thus associated with low profitability, demonstrating a negative relationship between leverage and profitability (Wiwattanakantang 1999:393).

A firm can thus have a dual issue, where the advantages and disadvantages of debt and equity financing should be considered simultaneously. Table 2.1 illustrates the results of a dual debt and equity issue as well as its correlation with the capital structure models.

Table 2.1: Trade-off vs. pecking order hypothesis under dual capital issues

Model	Variable	Hypothesis	
		Trade-off	**Pecking order**
Debt vs. dual issue	Profitability	Positive	No prediction
Dual vs. equity issue	Profitability	Positive	No prediction

Source: Adapted from Hovakimian et al. (2004:528–529)

The information of Table 2.1 indicates that the results of a study done by Hovakimian et al. (2004:528–529) on dual capital issues are consistent with the predictions of the trade-off model. They indicated a positive relationship between profitability and

leverage. However, they could not predict the possible relationship between profitability and the pecking order hypothesis under dual issues.

2.9 The saucer-shaped relationship between capital structure and profitability

According to Pandey (2004:83), there exists a u-shaped/saucer-shaped relationship between capital structure and profitability that is consistent with both the pecking order and the trade-off capital structure models.

The u-shaped relationship between capital structure and profitability indicates that firms with lower profitability will use more internal funds, because external funds are more expensive. This notion is consistent with the pecking order theory of capital structure, indicating a negative relationship between leverage and profitability. Pandey (2004:83) also indicated that more profitable firms will use more debt. The rationale is that when profitability increases, firms have more profits to shelter from taxes. Such firms are often able to produce more output by using their assets more effectively. These firms will then use more debt financing. This notion is consistent with the trade-off theory of capital structure, indicating a positive relationship between leverage and profitability.

The relationship between profitability and capital structure can thus either be positive or negative, based on the capital structure model that the firm uses. Figure 2.3 illustrates the u-shaped relationship between profitability and capital structure in accordance with the different capital structure models.

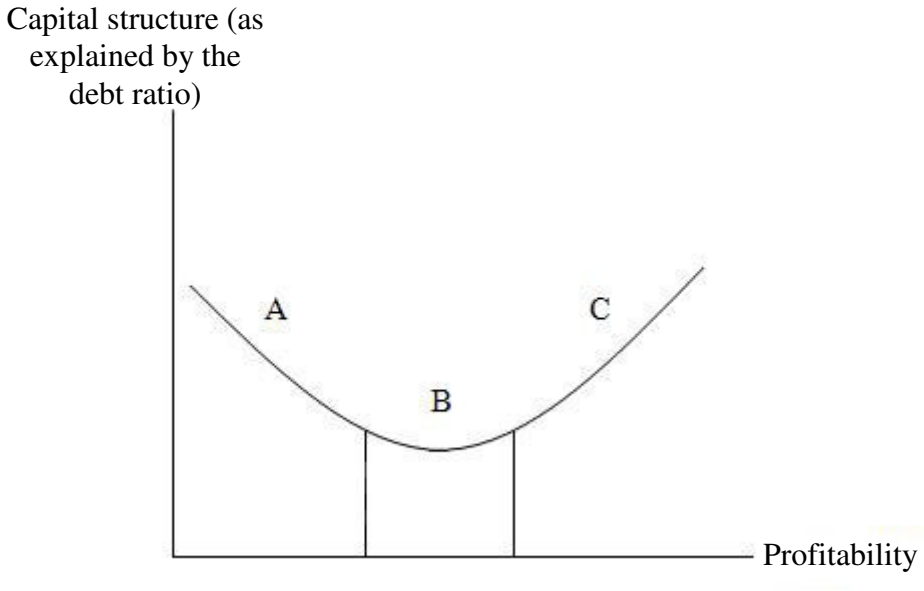

Figure 2.3: Capital structure and profitability
Source: Pandey (2004:83)

According to the pecking order theory (position A in Figure 2.3), highly profitable firms should use less debt financing, since internal funds will be sufficient for financing purposes. A negative relationship is thus indicated between leverage and profitability. When a firm follows the trade-off theory (represented by C in Figure 2.3), a higher debt ratio increases the probability of bankruptcy. When profitability decreases, the firm's debt usage also decreases, indicating a positive relationship between profitability and debt financing. There is also a medium profitability range (position B in Figure 2.3) where firms do not have enough motivation to increase or decrease their debt usage (Pandey 2004:83).

Capital structure conditions are restrictive, stating that if business and industry conditions change, financing decisions may also change. The firm may then move from one capital structure model to another (Eldomiaty 2007:26).

2.10 Firm and industry characteristics

Financing decisions are mostly associated with long-term decisions, mainly in large listed firms. These firms normally establish an appropriate combination of debt and equity financing. This target capital structure has an important impact on the firm's cost of capital, since it determines the weights of the different financing forms (Lindbergh 2003:7).

Harris and Raviv (1991:333) stated that firms within an industry are more similar than firms in different industries. Industries also tend to retain their relative leverage. The results of Ozkan's (2001:177) empirical research state that firms in the same industry, facing comparable conditions and tax status have similar leverage ratios. Generally, industry debt ratios tend to be low when profitability is high (Myers 2001:83).

Empirical research on capital structure is often conducted within developed, industrialised countries. Less research seems to be conducted within developing countries, such as South Africa. Pioneer researchers in developing countries found that these countries rely more on equity issuing than on debt financing, in contrast with their counterparts in the developed economies that use more debt financing (Tong & Green 2005:2180; Booth et al. 2001:91). The capital structures of different developing countries are indicated in Table 2.2.

Table 2.2: Capital structures in different developing countries

Developing Countries	Total debt to total assets (book value, %)	Long-term debt to total capital (book value, %)	Long-term debt to total capital market values, %)
Malaysia	42%	13%	7%
Jordan	47%	12%	19%
Turkey	59%	24%	11%
Pakistan	66%	26%	19%
India	67%	34%	35%
South Korea	73%	49%	64%
South Africa	79%	62%	35%

Source: Adapted from Smart et al. (2004:415)

The results of a survey done by Smart et al. (2004:415) were consistent with the notion that developing countries rely more on equity financing than on debt financing. However, the results also revealed that, when comparing the debt ratios of firms in other developing countries, South African firms appear to have higher debt ratios on average. In Table 2.2 it is indicated that South Africa has the highest debt to total assets ratio of all the developing countries in the study, namely 79%.

2.11 Summary

The primary objective of a firm's managers is to maximise the wealth of its shareholders. These managers also conduct the firm's investment and financing decisions. The finance decision is important to this study since it considers the firm's combination of debt and equity financing (Brigham & Houston 1998:22). Capital structure theory is often characterised by a quest for an optimal capital structure (Shyam-Sunder & Myers 1999:219–221).

Taxes, bankruptcy costs and asymmetric information can impact on a firm's capital structure decisions. Corporate income taxes are an important capital structure determinant, since it influences the interest on debt financing. It could be advantageous to firms, since interest payments are tax deductible (Desai et al. 2004). Myers (2001:89) stated that if managers can take advantage of interest tax shields, higher profitability indicates that a firm has more taxable income to shield. The firm can then use more debt financing without facing the risk of financial distress. However, the presence of bankruptcy costs tends to alleviate a firm's debt usage (Ross 1977:24). Firm managers may also hold asymmetric information that other market participants do not have access to. The firm's choice of capital may then act as a signal to outside investors, where equity issuing is regarded to be a negative signal. Firms will thus tend to prefer debt instead of equity financing (Michaelas et al. 1999:116; Myers 1984:585).

However, in practice, firms normally adjust their debt levels in response to their profitability (Goldstein et al. 2001:483). Two contradicting capital structure models can be used to predict the debt usage of firms, namely the trade-off model and the pecking order model. The trade-off theory predicts that a persistent increase in profitability will lead to more extensive debt usage, since it increases the interest tax-advantage and may reduce the expected financial distress costs (Strebulaev 2007:1769). According to the pecking order theory, the existence of asymmetric information guides firms to give priority to internal generated funds over debt and new equity issues (De Miguel & Pindado 2001:80).

These two models thus have contradicting predictions regarding the relationship between leverage and profitability. According to the trade-off model, there is a positive relationship between debt and profitability. In contrast, the pecking-order model indicates a negative relationship between these two variables. The two capital structure

models are not mutually exclusive. Firms can decide on their target leverage ratio, based on the trade-off model, but they may deviate from their targets to include the benefits of the pecking order model (Titman & Tsyplakov 2006:1; Tong & Green 2005). A firm can also use a dual debt and equity issue that is usually consistent with the trade-off model (Hovakimian et al. 2004:528–529).

Pandey (2004:83) revealed that the relationship between capital structure and profitability is saucer-shaped, where the pecking order theory indicates that profitable firms will use less debt financing. In contrast, the trade-off model indicates that a higher debt ratio increases the possibility of going bankrupt. If the firm's profitability thus decreases, the debt usage also decreases. There is also a medium range of profitability where firms do not have enough motivation to change their debt levels. A saucer-shaped relationship is thus indicated between leverage and profitability, where leverage decreases or increases according to the two capital structure models.

It was indicated that firms' capital structure can be influenced by a number of factors. These factors can include firm-specific, economic and industry factors. Empirical research on capital structure seems to be mainly conducted within developed countries. However, South Africa provides the ideal environment for capital structure research within developing countries, due to its highly variable economic environment. The possible effect of different economic factors on firms' capital structure is therefore investigated in the next chapter.

CHAPTER 3

THE EFFECT OF THE ECONOMIC ENVIRONMENT AND ECONOMIC VARIABLES ON CAPITAL STRUCTURE

3.1 Introduction

Capital structure theory was discussed in the preceding chapter. Modigliani and Miller (MM) were the pioneers for capital structure theory. However, their studies were based on strong assumptions that are often not realistic in practice. Therefore, MM relaxed some of their assumptions, in order to provide a more realistic capital structure theory. Amongst others, they recognised that the effect of corporate taxes, bankruptcy costs and asymmetric information should be considered (Brigham & Daves 2004).

The effect of corporate taxes is important, since interest payments on debt financing are tax deductible, while dividend payments to shareholders are not. This differential tax treatment thus favours the use of debt financing. Since bankruptcy costs do exist in practice, firms should also consider the possibility of going bankrupt. This led to the development of the trade-off theory were the advantages of debt financing are traded-off against the higher bankruptcy possibility. The pecking order theory should also be considered. This theory is based on the assumption that firm managers hold information to which firm outsiders do not have access. This is called *asymmetric information* and it can have an important effect on the firm's optimal capital structure. Capital issues are regarded as market signals, with an equity issue considered to be a negative signal. A firm with positive prospects will thus aim to avoid equity issues (Brigham & Daves 2004).

The question arises whether other factors could also have an influence on capital structure. The possible effect of specific economic factors on capital structure decisions will therefore be discussed in this chapter. The economic factors of concern to this study are the economic growth rate, interest rate, inflation rate as well as the exchange rate. Every factor will be discussed in terms of its components, the way it is influenced by

different factors, as well as the effect of each factor on the capital structure. Previous studies, or the lack thereof, will also be considered.

The remainder of this chapter is divided into seven sections. The first section identifies the different variables that can have an influence on the firms operating within a country. The second section examines economic growth, its influential factors, as well as its impact on capital structure. In the third section, the composition and determination of interest rates are discussed, as well as its influence on different capital structure components. The possible beneficial and detrimental effects of inflation on capital structure and the other economic variables are indicated in the fourth section. Inflation targeting and forecasting will also be discussed. The exchange rate is another important economic factor to be considered. Exchange rate determination, different exchange rate systems and the impact of the exchange rate on the capital structure are discussed in the fifth section. In the sixth section, the combined effect of the four economic variables of interest to this study is discussed, based on the South African monetary policy framework. The final section of this chapter is a summary on the effect of the various economic variables of capital structure.

3.2 The economic environment

The political, cultural, legal and economic environments within a country will mainly influence the costs and benefits of doing business within that country. The economic environment is important for a number of reasons, notably the level of development, the economic policies and the future economic prospects. The purpose of economic analysis is to assess a country's economic outlook in the long run, as well as the impact of potential changes in the economic variables on the firms within the country. These variables include, amongst others, the exchange rate, interest rate, inflation rate and the economic growth rate over time (Hough & Neuland 2007:119–120).

3.3 Economic growth

Profitable and growing firms are under constant pressure to increase their profits and sales by expanding their markets, both domestically and internationally. In a firm's search for attractive market opportunities, the economic development and growth rate within a country are important factors to consider. Economic growth can be defined as

the increase in the capacity of an economy to produce products and services in the long run (Hough & Neuland 2007:126, 133). The economic output growth of a country is measured by its gross domestic product (GDP). GDP consists of all the products and services produced within a country during a specific period, usually a year (Blanchard 2006:23).

The main indicator of economic development is an increase in a country's GDP per capita (World Bank 2009). This ratio is obtained by dividing the GDP of a country by its population. It is a relative measure that is comparable between countries and it is used to classify countries in terms of their economic development. However, a disadvantage is that such a ratio only provides a static economic representation at a specific point in time (Hough & Neuland 2007:126–127).

Growth literature normally uses growth and explanatory variables that are averaged over longer periods of time (Demirgüç-Kunt & Vojislav 1996). Economic growth has been the subject of intensive empirical studying. Long- and medium-run growth rates generally vary across different economies in cross-country growth studies (Quah 1993:426). It is a dynamic phenomenon where countries may experience successive cycles of economic recession followed by economic upswing that usually reflects an upward growth trend in the long run (Hough & Neuland 2007:128–129). Countries can be classified into specific growth categories, according to their long-term economic growth rate and level of economic development (Hough & Neuland 2007).

3.3.1 The economic classification of countries

Countries are classified into specific categories according to their level of economic development. The three possible development categories for countries are *developed countries*, *less developed countries* and *developing countries* (Hough & Neuland 2007:129–131).

Developed countries have well-developed economies with high income levels, political stability and high levels of education. *Less developed countries* have low income levels and are often characterised by political instability, shortage of investment capital and high illiteracy rates. *Developing countries* are in the process of evolving from less developed to developed countries. They are distinguished by relatively stable political conditions, improving educational and human development systems, relatively efficient technological systems as well as a rapidly developing financial sector. South Africa is

classified as a developing country (World Bank 2009; Hough & Neuland 2007:129–131).

3.3.2 Economic growth and developing countries

There are two forms of economic growth that developing countries have to consider, namely *extensive* and *intensive* growth. An economy can grow *extensively* by using more resources, such as capital. This type of growth does not result in per capita income growth. However, *intensive* growth occurs by means of more efficient resource usage that result in higher per capita income and an increase in living standards. A certain level of economic development is required for intensive economic growth to occur (World Bank 2009).

Solow (1956) introduced a neoclassical development framework for economic growth theory that has been widely used ever since. According to neoclassical growth models, a country's per capita growth rate has a tendency to be inversely related to that country's income level per person (Barro 1991:407). The savings rate and population growth are two important variables in the stable-state level of per capita GDP. Solow predicted that, if the savings rate increases, the country becomes richer, and if the population growth increases, the country becomes poorer (Mankiw, Romer & Weil 1992:407; Solow 1956). Barro (1991:407) stated that under these circumstances, poor developing countries tend to grow faster than richer developed countries.

Many economists stressed the importance of human capital on the progression of economic growth (Barro 1991:408). Mankiw et al. (1992:408) extended Solow's traditional growth model to include the effect of physical and human capital. They stated that if human capital increases, higher savings and/or lower population growth tends to lead to a higher income level per person. Cass (1965:238) stated that even a relatively capital-poor country will pursue optimum growth by increasing its physical capital to human capital ratio in the long run. A country may accomplish this by saving more in the future than in the present.

Human capital is the main input to the research sector, where new ideas are generated and new technologies are developed (Romer 1990). Countries with larger initial human capital have an occurrence of more rapid product introductions and thus faster growth. Human capital can also enable a country to easily absorb new technology that had been developed elsewhere in the world. Therefore, a developing country with more human

capital tends to grow faster because it catches up more rapidly with the technological leader countries. However, this depends on the condition that the developing country's human capital exceeds the amount of human capital that usually escorts a low level of per capita income (Barro 1991:409).

The effect of technological changes was not included in the traditional growth literature. However, recent literature draws attention to the dependence of a country's growth rate on the state of its domestic technology relative to the technological development of the rest of the world. The growth rate of developing countries, such as South Africa, is thus in part explained by such countries' ability to adopt and implement new technologies that are already in use in developed countries (Borensztein, De Gregorio & Lee 1998:116).

Developing countries regard foreign direct investment (FDI) by multinational firms as a key channel for access to advanced technologies. Technological progress takes place due to “capital deepening” in the form of new, lower-cost capital varieties. The introduction cost of new capital products is lower for countries that produce fewer varieties of capital products. This has an increasing effect on the introduction rate of new capital products in these countries. Consequently, these countries will tend to grow faster (Borensztein et al. 1998:116–121).

In a study by Borensztein et al. (1998) on FDI flows from developed to developing countries, it was found that FDI contributed to growth in a larger measure than domestic investment. FDI is also regarded an important vehicle for technology transfer. In addition, the effect of FDI is positively related to a country's human capital level. Thus, the higher the level of human capital and human development, the higher the FDI effect on the growth rate of the economy.

South Africa had limited access to foreign funds until 1994, since multinational investors disinvested in the country due to the apartheid regime. After the 1994 democratic election, there was an increase in the availability of foreign funds. However, South Africa still receives comparatively low levels of foreign capital in the form of direct investments (Thomas, Leape, Hanouch & Rumney 2005). Recent experience and theories could not unambiguously support the notion that foreign capital made a significant contribution to the long-term economic growth of developing countries, such as South Africa (Padayachee 1995:163).

FDI could thus contribute to economic growth by expanding the developing country's capital accumulation and by increasing the efficiency of the country's technological and human capital development. However, there exists a debate in finance literature on the possible impact of a country's financial sector on its growth rate. The relationship between finance and growth will be discussed in the next section.

3.3.3 The relationship between economic growth, the financial sector and capital structure

There is a consistent debate in finance literature on the relationship between growth and the financial sector. The question is whether financial markets and institutions have an important impact on both economic and productivity growth. Levine (1997:691) developed a theoretical approach to finance and growth and this is illustrated in the model in Figure 3.1.

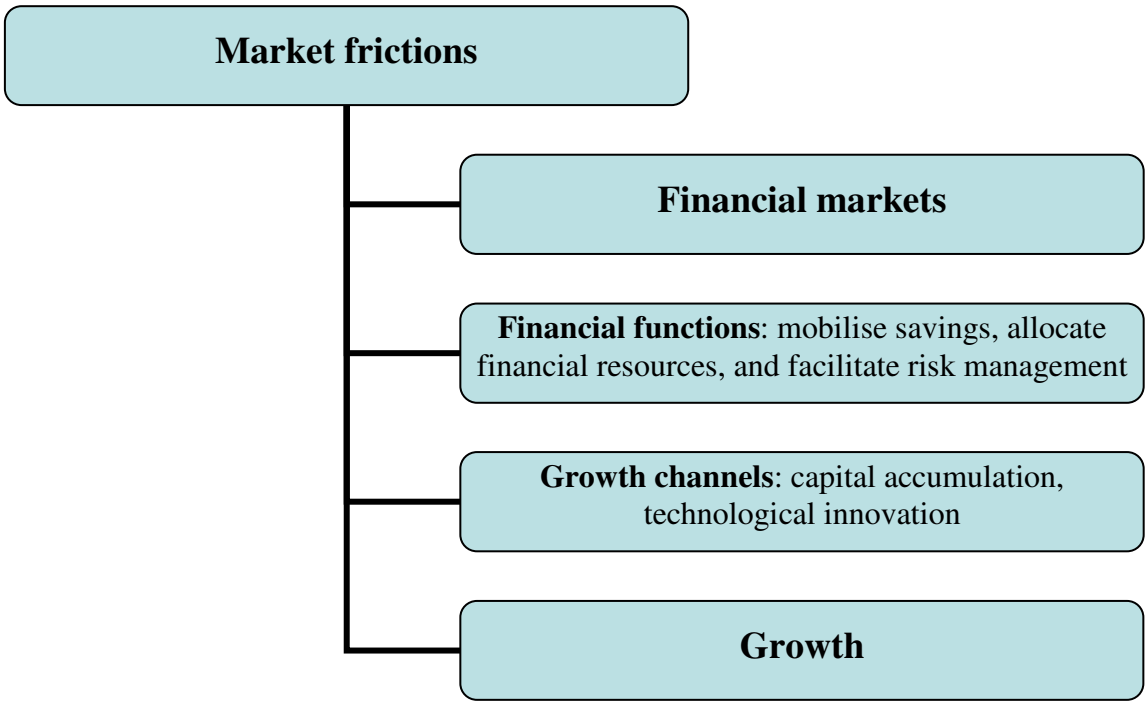

Figure 3.1: A theoretical approach to finance and growth

Source: Levine (1997:691)

The model starts with market frictions stemming from capital transactions and the costs of acquiring market information. This creates an incentive for the emergence of financial markets and institutions, such as banks, to provide a variety of financial functions and services, including the facilitation of capital trading, financial resource

allocation and the mobilisation of savings. According to Figure 3.1 it is also clear that economic and productivity growth is related to the growth and accumulation of capital. This is based on the principle that the higher the growth in capital, the more labour-saving technological improvements can be adopted. Theoretically, productivity will increase, resulting in higher economic output and consequently higher economic growth (Levine 1997:691; Kaldor 1957:596–597).

However, in finance literature, there exists considerable debate on the relationship between the economic growth rate and the financial sector of a country. Some economists maintain that the banking system can spur future economic growth by the funding of productive investments, while others disregard the financing sector's growth impact (Aghion & Durlauf 2005:867; Levine & Zervos 1998:537).

Dornbusch and Reynoso (1989:204) stated that the efficiency of financial resource usage and a country's financial institutions can have an important impact on economic growth. The reasoning behind this notion is that financial institutions influence the availability of savings as well as the allocation of these savings to firms in the form of debt capital that spurs growth. In contrast, Lucas (1988:6) stated that economists overstate the role and importance of a country's financial system. Robinson (1952) stated that “where enterprise leads finance follows”. According to this view, economic growth creates the demand for specific types of financial arrangements. The financial system then automatically responds to these demands (Levine 1997:688).

King and Levine (1993:735) revealed that financial services stimulate economic growth by increasing the rate of capital accumulation and by improving the efficiency of capital usage. When financial markets and services are absent, firm-specific shocks may discourage risk-averse investors from investing in the firm. However, share markets allow individual investors to invest in different firms and thus diversify themselves against firm-specific risks. This tendency leads to an increase in the amount of financial resources available to firms. The consequent effect is an increase in the country's economic growth rate (Levine 1991:1459).

Although there is expanding literature on the relation between long-term growth and share markets, fairly little empirical research however exists (Levine & Zervos 1998:537). Levine (1991) derived a more liquid share market model where it is less expensive to trade equities. Investors can thus trade their share ownership more easily

and at a lower cost. Improved liquidity improves capital investment in longer-term projects, since the financial investment ownership can easily be converted into cash. This is important for a country's economy, since longer-term, high-return financial investments enhance economic growth.

If economic growth requires investment, the following provisions should be complied with: savings must be available, and firms should be willing to invest and channel these savings towards the most attractive investment opportunities. The country's financial structure and financial institutions can either enhance or disrupt this process. Firms will thus be discouraged to invest their retained earnings if poor financial policies reduce the return on their investment (Dornbusch & Reynoso 1989:204–205).

The growth of an economy is often related to its fiscal policy. There exists a well-rooted conviction that taxation and public investment can contribute to economic growth, either positively or negatively (Easterly & Rebelo 1993:1). One of the most important effects of government intervention on growth is the lowering of savings and consequently growth through the distorting effects of taxation on income. Firms thus have less retained earnings available for financing purposes. They should then consider other financing sources, such as debt financing provided by the financial sector (Barro 1991:430). Huang and Ritter (2004) found that real GDP growth is positively related with debt usage, but it is not reliably associated with equity issues.

Both banking development and share market liquidity are good predictors of a country's real per capita GDP as well as such country's future economic and capital growth rates (Levine & Zervos 1998:538). Demirgüç-Kunt and Vojislav (1996) indicated that firms grow faster in countries with more efficient banks and equity markets, than what is indicated by their firm-specific characteristics. However, financial factors do not have such an important effect on the per capita GDP, unless it is distorted or if financial instability becomes a dominant economic force (Dornbusch & Reynoso 1989:204).

Rajan and Zingales (1995) revealed that if industries rely more on external financing sources, they excel in countries with improved financial markets. Financial factors thus play a central part in the economic growth process and economic development of a country (Levine & Zervos 1998:554; Dornbusch & Reynoso 1989:204). The lack of financial services can consequently inhibit effective economic growth (Patrick 1966:175).

3.4 Interest rates

The determination of a firm's cost of capital is an important quest in a world where funds are acquired from different sources, ranging from debt to equity financing. The cost of financing is also an important consideration for bankers. The traditional view on the cost of capital is that debt financing is several times cheaper than equity financing in the absence of taxes, while the presence of taxes simply magnifies the relative cost ratio in proportion to the corporate tax rate (Shimko, Tejima & Van Deventer 1993; Modigliani & Miller 1958).

The appropriate cost of capital is a weighted average of the costs of equity and debt financing sources, where the weights are the proportions of each financing source in the target capital structure (Modigliani & Miller 1963:441). According to Boskin (1978:14), the real net rate of return on capital can also be measured by the effect of inflation and taxes on the nominal rate of return. In South Africa, the repo rate is the interest rate at which the South African Reserve Bank (SARB) influences liquidity conditions through the repurchase of short-term funds from commercial banks (Nowak & Ricci 2005:4). The determination of the interest rate and its components are discussed in the following section.

3.4.1 The interest rate and its components

Interest rates can be divided into nominal and real interest rates. A consideration of the fluctuations and stationarity of both nominal and real interest rates can thus be meaningful. Numerous studies indicated that the nominal interest rate is composed of two parts: the real interest rate and the expected inflation rate (Kandel, Ofer & Sarig 1996:211; Rose 1988:1095–1096).

Irving Fisher (1930) formulated the Fisher equation. This equation comprises a parity relationship which states that the nominal interest rate in a country is equal to a real interest rate plus an expected inflation premium (Mishkin 1984:1346). The relationship between the real interest rate, the nominal interest rate and the inflation rate can be approximated by the following equation (Bodie, Kane & Marcus 2003:147):

$$r = R - i \quad (3.1)$$

where:

r = the real interest rate,

R = the nominal interest rate

i = the inflation rate

The approximated real interest rate is thus the nominal rate reduced by the loss of purchasing power due to inflation. In effect, the exact relationship between the real and the nominal interest rate is illustrated by the following equation (Bodie et al. 2005:147):

$$r = \frac{R-i}{1+i} \quad (3.2)$$

The real interest rate is the growth rate of purchasing power derived from an investment, excluding any inflation effects (Bodie et al. 2003:147). Furthermore, the real interest rate is a crucial determinant of savings and investment decisions (Rose 1988:1095). Kandel et al. (1996:221–222) tested the Fisher hypothesis that the real interest rate is independent of inflation expectations. However, they found a negative correlation between real interest rates and expected inflation that contradicts the Fisher hypothesis. It is thus important to note that there is no unique real interest rate. The magnitude of a real rate is dependent on both the price index that is used to calculate the real return and the risk characteristics of the security (Mishkin 1984:1349).

When the expected inflation rate increases, it will tend to increase the nominal interest rate. This relation reflects the economic theory that interest rates reveal expectations regarding possible future inflation rates (Hough & Neuland 2007:165). However, Crowder and Hoffman (1996:116) found that short-term interest rates may not be efficient predictors of future inflation. In addition, Pennacchi (1991:56) stated that short-term interest rates are more volatile than the immediate expected inflation rate. Long-term interest rates should thus be considered, since investors require positive real returns on their investments over time. When expected inflation is high, interest rates also tend to be high to compensate investors for the decrease in the value of their invested capital (Hough & Neuland 2007:165). High interest rates reduce the present value of future cash flows on investments and it can have a negative effect on the attractiveness of investment opportunities (Bodie et al. 2003:385).

Since interest rates determine the cost of debt capital, it is important to understand the economic foundations of interest rate determination. In the next section, the focus is therefore placed on the economic determination of interest rates.

3.4.2 Economic interest rate determination

When financial markets are in equilibrium, the supply of money is equal to the demand for money. The equilibrium interest rate should be such that people, given their current income level, are willing to hold an amount of money equal to the existing money supply (Blanchard 2006:72). The economic determination of interest rates is illustrated in Figure 3.2.

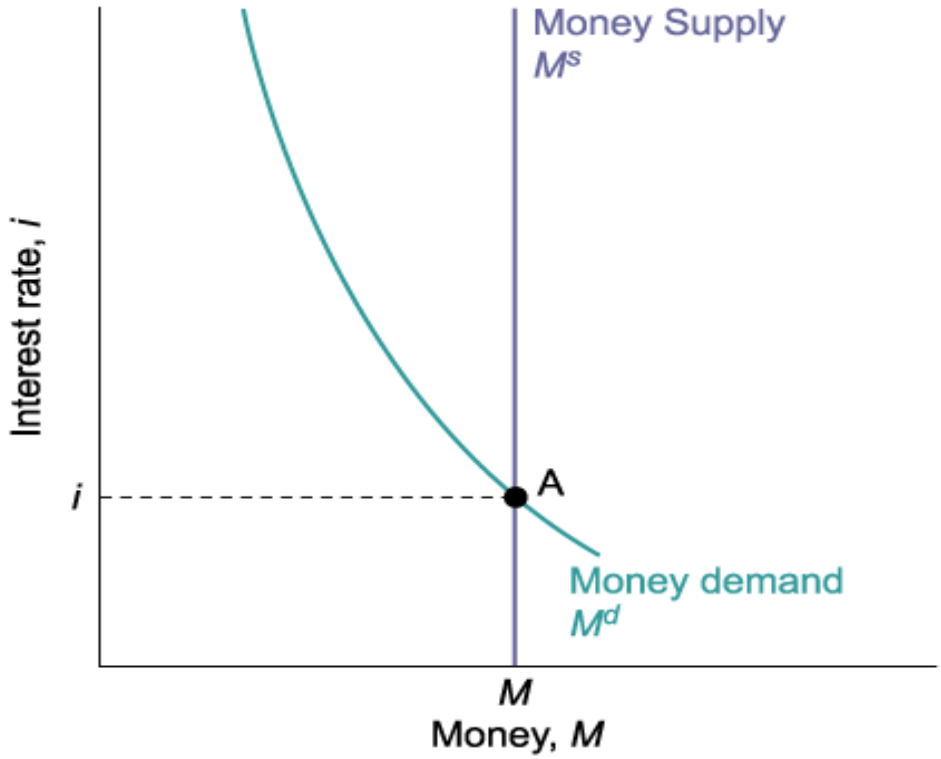

Figure 3.2: The economic determination of interest rates

Source: Blanchard (2006:72)

The equilibrium interest rate (i) is founded where the money demand (M^d) equals the money supply (M^s) at point A in Figure 3.2. The equilibrium interest rate has to be such that the supply of money, which is independent of the interest rate, is equal to the demand for money, which is dependent on the interest rate. Changes in the money

demand and/or money supply will thus affect the equilibrium interest rate and a new equilibrium interest rate should then be determined (Blanchard 2006:72).

3.4.2.1 The effect of changes in nominal income on interest rate levels

The demand for money is influenced by a change in the nominal income levels. An increase or decrease in nominal income will most likely have an impact on the interest rate level (Blanchard 2006:72). The effect of an increase in nominal income on the interest rate is indicated by Figure 3.3.

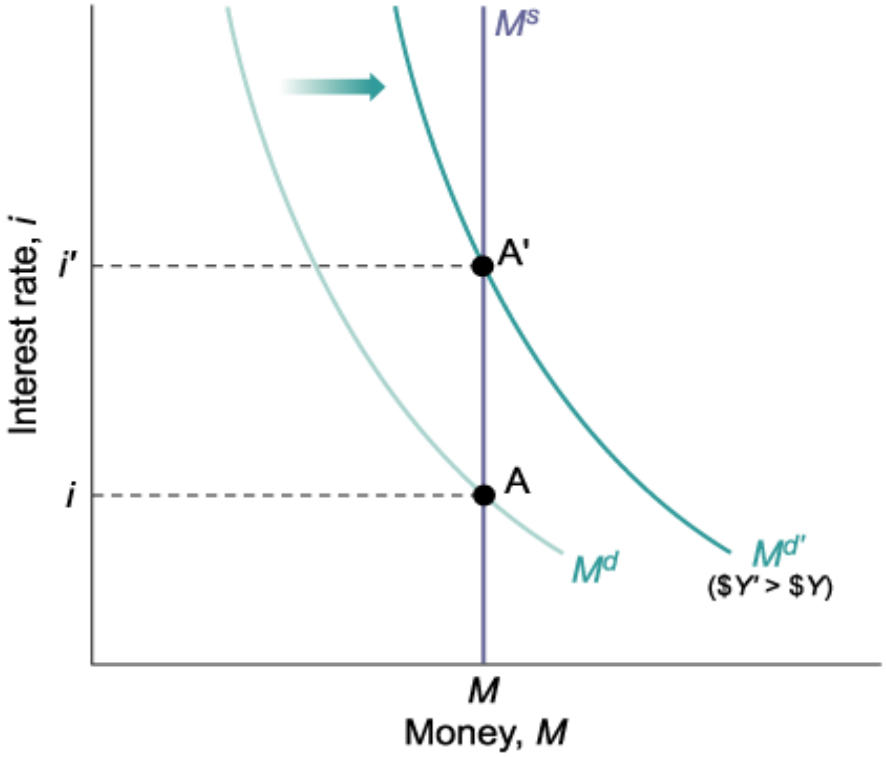

Figure 3.3: The effect of an increase in nominal income on the interest rate

Source: Blanchard (2006:73)

An increase in nominal income increases the level of transactions that take place in the economy. This leads to an increase in money demand at any interest rate level. The money demand curve shifts to the right, from M^d to $M^{d'}$, as illustrated in Figure 3.3. The equilibrium interest rate thus increases from i to i' and the equilibrium moves from A to A'. When nominal income increases, it thus leads to an increase in the interest rate, to decrease the amount of money that people want to retain (Blanchard 2006:72).

3.4.2.2 The effect of changes in the money supply on interest rate levels

When the central bank increases or decreases the supply of money, it will probably have an impact on the equilibrium interest rate. Figure 3.4 shows the effect of an increase in the money supply on the interest rate level (Blanchard 2006:72).

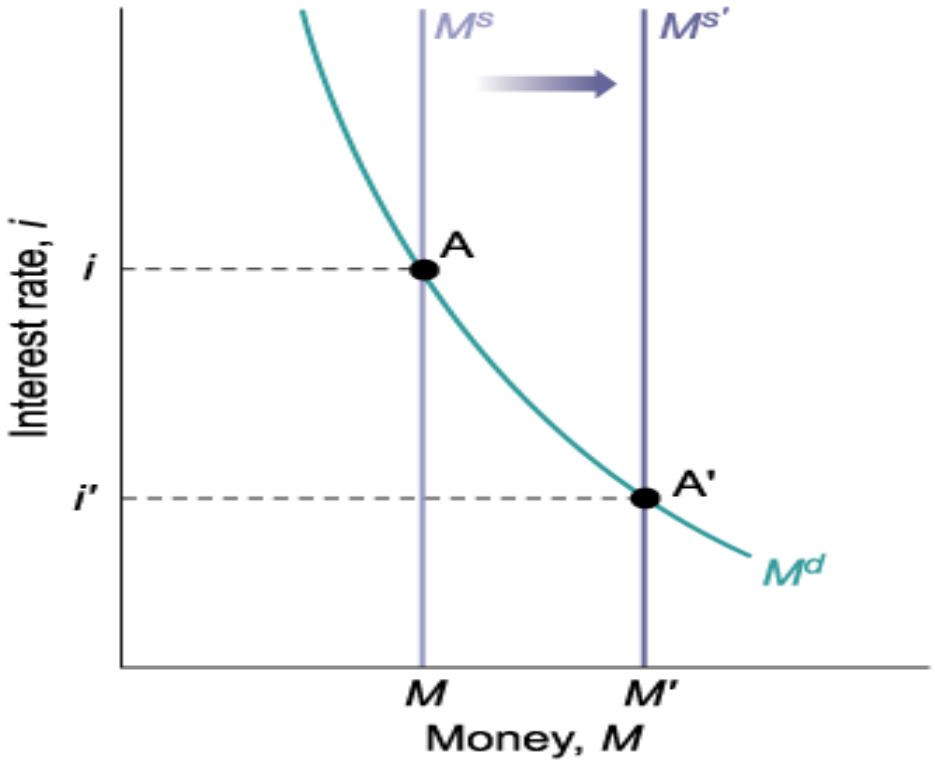

Figure 3.4: The effect of an increase in the money supply on the interest rate

Source: Blanchard (2006:73)

In Figure 3.4, it is indicated that an increase in the money supply by the central bank leads to a rightward shift in the money supply curve from M^s to $M^{s'}$. This results in a consequent decrease in the interest rate, from i to i'. An increase in the money supply thus gives rise to a decrease in the interest rate. The decrease in the interest rate leads to an increase in the demand for money, in order to equal the larger supply of money and to restore the equilibrium (Blanchard 2006:72).

The economic determination of interest rates illustrates the effects of nominal income, money demand and money supply changes on the cost of capital. The managers of firms should thus understand the determination of interest rates, since this determines the cost

of debt financing. In order to decide between the different financing sources, the various costs should be considered, leading to an optimal capital structure at the lowest cost.

In South Africa, there were various monetary policy regimes since the 1960s. The effect of the monetary policy on interest rates is discussed in the following section.

3.4.3 The impact of South African monetary policy on interest rates

There have been three broad monetary policy regimes in South Africa since the 1960s. The first regime was based on liquid asset ratios with quantitative controls on credit and interest rates. Limited importance was given to interest rates as a corrective monetary tool (Aron & Meullbauer 2002:189). During the 1980s, the De Kock Commission of Inquiry into the Monetary System and Monetary Policy laid the foundation for monetary policy implementation (Smal & De Jager 2001:2). A cash reserves-based system with pre-announced money growth targets was introduced. The third system was introduced in 1998, namely the repurchase interest rate (repo) system where the SARB signals its short-term interest rates to the market through the cash amount offered at the daily tender for repurchase transactions (Aron & Meullbauer 2002:190; Smal & De Jager 2001:3-4).

The repo system was introduced in an attempt to ensure that interest rates react more quickly to changes in financial market conditions. Shortly after a repo rate decrease, domestic banks also adjust their lending rates. In 1998, the repo rate was changed from a floating to a fixed rate to eliminate ambiguity regarding the SARB's monetary policy signals (De Angelis, Aziakpono & Faure 2005:657–660; Smal & De Jager 2001:3–6). The monetary policy of a country can thus have an important effect on the interest rate level of that country. The effect of a country's monetary policy on interest rates can be divided into liquidity, income and expectations effects (Darby 1975:266).

3.4.3.1 The liquidity effect

The force behind the liquidity effect is to determine the effect of a change in the constant growth rate of money supply on the interest rate. When the growth rate of money supply increases, it creates surplus cash balances. The empirical argument is that neither the real income level nor the price level or the growth rate path is immediately affected. The nominal interest rate must decrease to restore the equilibrium of money supply and demand. The liquidity effect is reflected by this immediate impact of the monetary policy on the interest rate (Darby 1975:267).

3.4.3.2 The income effect

Over time, the aggregate demand for products increases due to the impact of a decrease in interest rates and the consequent availability of excess cash balances. The increase in demand causes an increase in prices and real income and leads to a consequent increase in the demand for money. However, the increase in real income above its normal growth path is usually temporarily. The price level is expected to rise adequately in order to completely reflect the growth of the money supply in equilibrium. This combined effect of the temporary change in the real income level and the more permanent increase of the price level on the nominal interest rate is referred to as the income effect (Darby 1975:268).

3.4.3.3 The expectations effect

The expectations effect refers to the Fisher equation stating that the nominal interest rate will exceed the real interest rate by the expected inflation rate. Increases in the observed inflation rate will cause the expected inflation rate to increase. This increase is expected to be equal to the growth rate of money supply. It is thus argued that the nominal interest rate will increase by exactly the same amount as the expected inflation rate in order to reach equilibrium in the capital market (Darby 1975:268).

It is assumed that the income effect cancels the liquidity effect on the real interest rate. The combined outcome of the three monetary policy effects on the interest rate is thus that the nominal interest rate increases by exactly the increase in the inflation rate (Darby 1975:268). There are also other factors that can have an influence on the interest rate level within a country. These factors are discussed in the next section.

3.4.4 Other factors that can influence a country's interest rate level

The national reserve policy, the level of the budget deficit and international factors such as the interest rate in other countries can also have an impact on the interest rate level within a country (Brigham & Houston 1998:141). Consequently, the interest rate can also have an effect on the other economic variables.

3.4.4.1 The national reserve policy

Money supply has a large impact on the inflation rate and the level of economic activity in a country. Economic growth can be stimulated by increasing the supply of money. The preliminary effect of the growth stimulation is a decline in interest rates. However,

an increase in the money supply may also lead to an increase in the anticipated inflation rate. This will consequently have an increasing effect on interest rates through the Fisher effect (Brigham & Houston 1998:141).

3.4.4.2 Budget deficit

If a country's government spending exceeds its income from tax revenues, a budgetary deficit occurs. The government's savings will then be negative (Blanchard 2006:58). The deficit must be covered by an increase in the supply of money, either by borrowing or printing money (Brigham & Houston 1998:141). Government borrowing can lead to an increase in interest rates, because such borrowing increases the total demand for credit in the economy. Economists believe that, in general, excessive government spending that results in government borrowing will have a negative, "crowding-out" effect on private investment and borrowing by forcing up the interest rate level (Bodie et al. 2003:385).

If a government prints money, the future inflation expectations are likely to increase, which also has a negative effect on interest rates. A federal deficit thus has a negative effect on interest rates and *ceteris paribus*, the higher the deficit, the higher the interest rate level (Bodie et al. 2003:385; Brigham & Houston 1998:141–142).

3.4.4.3 International factors

Firms in one country often trade with individuals and firms in other countries. If a country's exports are less than its imports, a foreign trade deficit occurs. Trade deficits needs to be financed, usually by debt financing. An increase in government borrowing normally has an increasing effect on the interest rate (Blanchard 2006:47; Brigham & Houston 1998:142).

The interest rate is the rate at which money can be borrowed for financing purposes (Brigham & Houston 1998). The determinations of the interest rate as well as different factors that can influence a country's interest rate level were discussed in the preceding sections. In the following section, the interest rate as the main cost component of debt financing to firms will be discussed.

3.4.5 The cost of debt financing

The cost of debt financing in the form of bank loans varies for all borrowers over time and for different type of borrowers at the same time. The interest rate will be higher for

more risky borrowers. If a firm is qualified as a prime credit firm due to its financial strength and size, it can generally borrow at the prime interest rate. This is a published interest rate that commercial banks charge to large, financially strong borrowers. If a firm is more risky, it can usually obtain debt financing at the prime rate plus some percentage points, and if the firm is less risky it can usually borrow money at the prime rate less some percentage points (Brigham & Houston 1998:673–674).

Capital is allocated among borrowers through interest rates. Firms with profitable investment opportunities are able and willing to pay the highest interest rate for debt capital. They tend to draw capital away from inefficient firms (Brigham & Houston 1998:123). The provision of capital to firms relies on capital provision criteria. These include debt provisions and the timing issue of debt financing (Jalilvand & Harris 1984; Lutz 1940:36).

3.4.5.1 Debt provisions

The value of a particular debt issue firstly depends on the required rate of return on risk-free debt (such as government bonds), secondly on the various debt provisions and restrictions contained in the debt agreement (such as the maturity date), and thirdly on the probability that the firm will be not be able to meet the terms of the indenture requirements (Merton 1974:449).

Rational investors will compare the long- and short-term markets before deciding in which market to invest. Investors will enter into the long-term market if the expected return over time is higher than the possible return in the short-term market over the same period and vice versa. The estimation of the profitability of the two markets will be based on the future interest rate and bond price expectations (Lutz 1940:48–49).

Investors may expect that at an intermediate date the bond yield will fall below the short rate expected between the intermediate date and the disinvestment date. This entails that the expected bond price will be relatively high on the intermediate date. If the bond valuation and interest payments, discounted by this high price exceed the market bond price, investors will probably invest in the long-term market. If it is below the market bond price, investors will most likely invest in the short-term capital market. Less long-term debt capital will then be available to firms for financing purposes (Lutz 1940:50).

3.4.5.2 The timing issue of debt financing

It has long been customary in studies on the theory of interest rates to refer to "the interest rate", thereby referring to all the different interest rates as a unit. It was assumed that the unit of interest rates moved up or down together. However, there are observable differences between long-term and short-term interest rates. The assumption that interest rates operate as a unit thus does not hold true (Lutz 1940:36).

It is argued that managers aim to time equity issuing and long-term debt usage to take advantage of favourable market conditions. The success of such a strategy depends on managers' ability to make superior share price and interest rate forecasts (Jalilvand & Harris 1984:132). Aron and Meullbauer (2005) stated that, if the course of interest rates is relatively predictable, investors often substitute short-term investments with long-term investments. The longer-term investments can possibly enhance economic growth, as more long-term financing is then available to firms. However, if managers expect long-term interest rates to rise, they may choose to issue more long-term debt in the current period. If a lower long-term interest rate is expected, the issuance of long-term debt is often postponed to take advantage of the lower interest rate in the future. More short-term debt and equity are then used for current financing requirements (Jalilvand & Harris 1984:131, 142).

The effect of financial structure and the different financing sources on firm valuation has long been a concern for finance theory. Modigliani and Miller (MM) provided the foundation for studying the impact of financial structure on firm valuation under perfect capital market conditions. However, capital markets are not always perfect, favourable or in equilibrium. The interest rate can be influenced by perfect and imperfect capital market conditions (Modigliani & Miller 1963; 1958). The relationship between changes in the capital market and capital structure decisions is therefore discussed in the next section.

3.4.6 Capital market conditions, interest rates and capital structure

Considerable attention has been given to equilibrium conditions in capital markets; however, few results are directly related to interest rates (Vasicek 1977:177). The effect of interest rates on economic behaviour has been a central concern for economists since the development of macro-economics (Boskin 1978:3). However, interest rates were only included by exception in econometric studies on saving behaviour. When interest

rates were included, the nominal rather than the real interest rate was used (Boskin 1978:7). Some researchers did state that there is a considerable negative relationship between the interest rate and savings. Others attributed fairly little weight to the effect of the interest rate (Musgrave & Musgrave 1973). Boskin (1978:7) suggested that there exists a positive relationship between savings and the interest rate on investments.

Previous studies indicated that in a taxless, frictionless world with no bankruptcy possibility, changes in a firm's debt-equity ratio will not change the market value of its equity plus its debt (Scott 1977:1). Fama and Miller (1972) argued that in perfect capital markets, even if bankruptcy is a possibility, firms cannot change the total market value of their outstanding financing securities by issuing or retiring any security.

Under the assumption of a perfect capital market with no taxes or transaction costs and risk-neutral investors, market equilibrium will only occur if all securities, regardless of their maturity date, are expected to earn the same rate of return (Modigliani & Sutch 1966:180; Scott 1977:4). Perfect capital market analysis can provide valuable insight into firm behaviour; however, it denies many of the market characteristics that lead to initial firm development (Jalilvand & Harris 1984:128).

When the perfect market assumptions are relaxed, it leads to a number of issues. Market imperfections imply that financing decisions may affect the firm's value and target capital structure. This target capital structure may be influenced by taxes, agency costs and bankruptcy costs. The market imperfections may also lead to interdependency between the firm's financing and investment decisions (Jalilvand & Harris 1984:128).

The value of a firm's debt and its capital structure are interlinked and this has an important effect on the firm's value. The value of debt cannot be determined without knowledge of the firm's capital structure, which affects the firm's bankruptcy possibility. A firm's capital structure cannot be maximised without knowing the effect of leverage on the value of debt. Traditional capital structure theory stated that taxes are an important capital structure determinant, since if leverage increases, the tax advantage of debt financing are offset in the long run by the increase in the cost of debt financing (interest rates) due to the higher bankruptcy possibility (Leland 1994:1213).

In the presence of taxes, firms aim to maximise their debt usage. However, the tax advantage of debt financing does not necessarily indicate that firms should maximise the percentage of debt usage in their capital structure at all times. In some

circumstances, other financing sources such as retained earnings could still be cheaper when the effect of investors' personal income taxes is taken into consideration (Modigliani & Miller 1963:441).

The threat of going bankrupt also leads to an optimal capital structure which involves less than 100% debt financing (Modigliani & Miller 1963, 1958). Firms thus have optimal capital structures consisting of less debt financing than their actual debt capacity. The firm can thus borrow more, but prefers to use less debt financing to avoid the risk of going bankrupt (Kim 1978:60).

The firm can also aim to raise funds in the capital market in an attempt to avoid bankruptcy (Scott 1977:15). Equity can be sold to compensate bondholders for a decrease in the value of the debt financing that they made available to the firm. However, there is a limit on the maximum value of the equity that can be sold to meet contractual interest payments on debt financing. New equity may only be issued if the total value of new equity issued is less than the total value of all equity, given that the interest obligation is paid. That is to say shareholders' wealth should be positive (Scott 1977:5).

Debt financing can thus have two effects on the total firm value: Firstly, it can reduce firm value due to the possible costs of going bankrupt, and secondly, it can increase the firm's value as a result of the interest tax deductibility of interest payments on debt financing (Leland 1994:1219). Interest rates and inflation tend to move in the same direction (Bodie et al. 2003:387). In the following section, the inflation rate is discussed.

3.5 Inflation

Inflation is the sustained increase in the general price level of an economy. The inflation rate is the rate at which prices rise (Blanchard 2006:31). If the inflation rate for the last year was presumed to be 6%, it indicates that the purchasing power of money reduced by 6% during the year. The value of a rand thus depreciates by 6% in terms of the products and services that it can buy (Bodie et al. 2003:146). Deflation is the opposite of inflation, and refers to a sustained decrease in the price level within an economy. It does not occur very often, but it does happen. Japan, for instance, experienced deflation in the late 1990s to 2002 (Hough & Neuland 2007:136; Blanchard 2006:31).

At a given time, the prices of some products can increase while the prices of other products may decrease. The consumer price index (CPI) measures the general trend in prices, by indicating the cost of a "bundle" of products that is representative of the consumption basket of an average urban family. An increase in the cost of the standardised consumption basket is indicative of a trend towards an increase in the economy's price level (Bodie et al. 2003:146).

The consumer price index, excluding the effect of interest rates on home bonds in urban areas (CPIX), measures the same price changes as the CPI; it just excludes the interest rate effect. In South Africa, the consumer-related price indices are very efficient, since inflation comparisons can be made from year to year, by using the inflation rate in a specific base year (Hough & Neuland 2007:136–137).

The inflation rate also affects other economic variables, such as the interest rate payable on debt capital, the exchange rate, as well as the confidence in a country's economy (Hough & Neuland 2007:136). In order to understand the effect of the inflation rate on these variables, the macro-economic demand and supply shocks are considered in the following section.

3.5.1 The influence of inflation on the macro-economy

A country's macro-economy can be influenced by demand and supply shocks. A demand shock is an event that affects the demand for products and services within an economy, for example an increase in government spending. The increase in spending will tend to stimulate economic growth. It may also increase the interest rate, due to an increase in government borrowing. The inflation rate will probably increase if the demand for products is raised to a level beyond the economy's total productive capacity. Interest and inflation rates thus tend to move in the same direction as aggregate output (Bodie et al. 2003:387).

A supply shock is an event that has an effect on an economy's production capacity and associated costs, such as an increase in the price of imported products. Supply shocks are distinguished by an increase in aggregate output in the opposite direction as inflation and interest rates. A large increase in the price of an imported input product due to inflation will usually lead to an increase in production costs and a consequent increase in the price of the final product (Bodie et al. 2003:387).

Inflation occurs when aggregate demand increases faster than aggregate supply. The increase in demand occurs when government spending increases at a faster rate than tax income due to monetary policy changes. Inflation is often influenced by two factors: the demand-pull and cost-push factors (Hough & Neuland 2007:136).

According to the demand-pull factor, excess demand, due to reasonably priced borrowing or tax cuts, results in an increase in the final price asked by producers. The consequent outcome of the price increase is a demand for higher wages, with the intention that workers could maintain their living standards. The increase in the demand for a product thus "pulls" its price to a higher level (Hough & Neuland 2007:136).

According to the cost-push factor, a price increase occurs due to an increase in a firm's production costs. Wages constitute a large part of production costs. Additional labour costs are then passed on to consumers in the form of price increases. The prices of products are thus "pushed up" by an increase in the production cost of the products (Hough & Neuland 2007:136). Fedderke and Schaling (2005:91) provided evidence for cost-push inflation in South Africa, where prices are determined as a mark-up over productivity-adjusted labour costs.

3.5.2 Inflation-targeting in South Africa

Between 1985 and 2000, South Africa followed a monetary policy of setting predetermined targets for money growth. In order to avoid a recession, the SARB may frequently have chosen to overshoot its monetary growth targets (Nell 2000:319; 327). During the previous decades, the country experienced only moderate results with its monetary policy regimes. In 2000, the previous policy was abolished and a formal inflation-targeting monetary policy was implemented (Aron & Meullbauer 2005; Van der Merwe 2004:1; Nell 2003:155–156; Jonsson 2001:243–244; Van den Heever 2001:168). Inflation targeting presents a monetary policy framework where policy decisions are guided by the expected inflation rate relative to an announced inflation target (Green 1996:779).

The inflation-targeting framework has at its core the public announcement of measurable numerical targets for inflation within a specific period. The inflation target was set between 3% and 6% by 2002. An inflation range was selected since a degree of variation in inflation is likely, even under relatively stable economic conditions. A continuous target of 3% to 6% was set for the period beyond 2006. The primary goal of

the policy is the full commitment of the monetary authorities to price stability. It also enhances monetary policy transparency and the accountability of the SARB. However, it should be acknowledged that inflation targeting is a complicated process that relies on the forecasts of an uncertain economic environment (Aron & Meullbauer 2005; Van der Merwe 2004:6; Jonsson 2001:243; Van den Heever 2001:170–172).

In addition, if inflation can be forecasted, predictions can be made on how the market will react. It is an important consideration, since previous changes in interest and inflation rates tend to have an influence on present and future inflation rates (Modigliani & Shiller 1973). Inflation forecasting is therefore discussed in the following section.

3.5.3 Inflation forecasting

Modigliani and Shiller (1973:42) stated that past inflation rates and interest rates are the most important variables that contain information about the future trend of interest rates. The standard approach for inflation modelling is based on econometric models. The intention is to forecast the inflation rate by using a time series of data. The inflation rate is also proven to be related to various macro-economic indices, such as the interest rate (Belgrade, Benhamou & Koehler 2004:2).

When inflation is uncertain, it can have an important impact on the firm's investment and financing decisions. If a firm ignores this inflation effect, it can result in inefficient decision-making and capital losses (Chen & Boness 1975). However, even if inflation is fully anticipated, it can still impose market distortions and welfare costs to the firm. When inflation uncertainty is high, the firm will experience high business risk. Inflation uncertainty also decreases the certainty of the utilisation of a firm's tax shield on debt financing. The tax savings associated with debt financing will thus become very uncertain. The expectation is therefore that higher inflation will lead to a decrease in the firm's debt-equity ratio (Hatzinikolaou, Katsimbris & Noulas 2002:46–47).

Grier and Perry (2000:55) stated that inflation uncertainty has a negative effect on industrial production growth within a country. It is therefore argued that market price distortions, due to inflation, might have a negative impact on economic growth, since such distortions have a negative effect on the investor's investment value. The reasoning behind this notion is the close connection between growth and investment, where investment is generally required for growth to occur (Barro 1991:433).

Inflation may also have a depressing effect on economic growth through the expected growth rates of firms. When firms experience difficulty to finance growth, high inflation often forces them to choose between an increase in debt financing and a decrease in their real growth rate. A firm's real growth rate consists of its nominal growth rate minus the inflation rate. When firms thus decrease their real growth rate, the economic growth rate will decrease in return (Higgins 1981:36–37). However, although inflation often has a depressing effect on economic growth, it can offer some benefits to firms operating within the economy (Blanchard 2006:537).

3.5.4 The benefits of inflation

Inflation has a number of adverse effects, but it is not 100% detrimental to an economy. It has three possible benefits: seignorage, possible negative real interest rates and the acceptance of real wage adjustments (Blanchard 2006:537).

3.5.4.1 Seignorage

Money creation (seignorage) is the ultimate source of inflation, as it is one of the ways in which a government can finance its spending. A country's government can create money to finance its expenses as an alternative for public borrowing or tax rises. The revenues from money creation (seignorage) thus allow the government to lower taxes and/or to borrow less in order to encourage investment through firms operating within the country (Blanchard 2006:537–538). The effect of government policies on the inflation level and vice versa is a major concern to policymakers. Proposals to increase the level of firm investment in a country include that governments should cut their tax rates, reduce their spending and offer tax incentives to firms. The aim is to encourage investment within the country by offering firms a promising corporate environment (Eaton 1981:435).

3.5.4.2 Negative real interest rates

An economy with a higher inflation rate has a larger capacity to use monetary policy in order to fight a recession than an economy with a lower inflation rate. When an economy has an average real interest rate of 2% and an average inflation rate of 4%, the nominal interest rate is more or less equal to 2% + 4% = 6%. When an adverse shock impacts on the economy, the nominal interest rate can be decreased from 6% to 0%. Under the assumption that the expected inflation rate will temporarily stay constant at

4%, the real interest rate decreases from 2% to -4%. This will probably have a positive spending effect in order to aid the economy's recovery (Blanchard 2006:538).

In contrast, suppose that the average inflation rate was 0% instead of 4%. The real interest rate, which is the same as the nominal interest rate, can then only be decreased from 2% to 0%, since there is no inflation effect. The smaller decrease in the real interest rate will have a less influential spending effect. There is thus a positive spending effect associated with inflation that can have a positive impact on the functioning of a country's economy (Blanchard 2006:538).

3.5.4.3 More acceptable real wage adjustments

The real wage rate is the nominal wage rate which includes inflation, less the expected inflation. If inflation is therefore 4% and nominal wages increase with only 1%, then the real wage rate will decrease with 3% (4% - 1%). At 0% inflation, a nominal wage decrease of 3% will also lead to a 3% decrease in real wage rates. However, the real wage decrease will be easier accepted if it is due to the inflation effect instead of an ordinary wage decrease (Blanchard 2006:539).

Inflation thus has depressing effects and offers possible benefits to firms. It can also influence the firm's cost of capital through the Fisher effect, stating that the nominal interest rate is equal to the real interest rate plus the expected inflation premium (Mishkin 1984:1346). The possible effects of inflation on capital structure decisions and the cost of capital are therefore important considerations for firms' managers.

3.5.5 Capital structure decisions and inflation

The effect of inflation on capital structure decisions has been a central concern in finance literature over time (Kim & Wu 1988:183). Capital allocation takes place through the price system in a free economy. The price paid for debt capital is the interest rate. The cost of equity capital is the expected dividends and capital gains to investors. The sum of the cost components is the total cost of capital to the firm. When a firm considers its capital structure, inflation is thus an important factor to consider, due to its influence on the cost of capital (Brigham & Houston 1998:122).

Hochman and Palmon (1983:793) examined the effect of inflation on firms' capital demands. They stated that the effect of inflation on a firm's demand for investment depends on the way inflation impacts on the return rate and not on the firm's capital

structure. They concluded that the real rate of interest on debt financing is less affected by inflation than the real rate of return on equity financing.

3.5.5.1 The effect of inflation on debt financing

A firm is expected to use more debt financing than equity financing during an inflationary period. The proposed reasoning is that the cost of debt financing will decrease due to the Fisher effect on interest rates, where inflation has a decreasing effect on the real cost of debt financing (DeAngelo & Masulis 1980).

Debt financing decisions are thus affected by inflation since there is no provision for perfect inflation adjustments. The real tax effect of interest deductions on debt financing increases when inflation increases. This effect occurs because firms are allowed to deduct their interest expenses at the nominal interest rate, taking into consideration the effect of inflation (Hochman & Palmon 1983:785). Kim and Wu (1988:198) found supporting evidence for the view that a firm's debt level will increase when inflation increases.

Inflation increases the financial dependency of firms on external financing sources. If a firm's creditors understand the effects of inflation, the increase in debt financing does not create difficulties. The creditors then understand that the real value of the firm's liabilities declined due to inflation. They will supposedly be willing to extend more credit to the firm, but probably at a higher nominal interest rate. However, when creditors do not understand the effects of inflation, they might restrict the firm's access to the credit market (Modigliani 1982:257; Higgins 1981:40).

However, Schall (1984) offers an opposing view on the effect of inflation on debt financing. He stated that, during periods of high inflation, the after-tax return on shares and thus equity financing is relatively higher than the return on bonds. Therefore, investors will exchange debt financing for equity financing and the firm's debt ratio will decrease. The effect of inflation on equity financing is thus an important capital structure consideration to the firm.

3.5.5.2 The effect of inflation on equity financing

Traditionally, equity has been regarded as a hedge against inflation. Equity represents a claim against physical assets. The real return on equity should thus be unaffected by inflation. However, inflation depresses the return that shareholders receive, since it has a negative effect on the tax that firms have to pay (Modigliani & Cohn 1979:24–27).

The supposed explanation for this tendency is that firms are taxed on their reported profits and not on their adjusted profits. When taxes rise with the inflating reported profits, the tax rate on real profits, excluding the inflation effect, also increases. Shareholders receive the return on their shares out of the firm's reported after-taxed profit. In addition, inflation can also have a distorting effect on a firm's balance sheet. Recorded financial statement values are often significantly different from their true market values (Brigham & Daves 2004:251; Modigliani & Cohn 1979:27).

Inflation causes investors to commit two capital evaluation errors when evaluating firms' common shares, namely the capitalisation and reduction gain errors. Firstly, during periods of inflation, investors capitalise the possible earnings on equity at a rate that is similar to the nominal interest rate instead of the real interest rate. In the presence of inflation, the comparison of the cash return on equity should be compared with the real return on debt financing. Secondly, investors also fail to take into consideration the gain accruing from the reduction in the real value of the firm's nominal liabilities. This is a representation of capital repayment, instead of an expense, and it is thus not tax deductible (Modigliani & Cohn 1979:24).

International trade and investments are facilitated by the foreign exchange market, where one currency is transformed into another currency (Hough & Neuland 2007:164). In the following section, exchange rates are discussed.

3.6 Exchange rates

The exchange rate indicates the number of units of a given country's currency that can be bought with one unit of another currency (Bodie et al. 2003:383; Brigham & Houston 1998:706; Dornbusch 1980). The exchange rate quotation can be direct or indirect. A direct quotation gives the home currency price for one unit of a foreign currency, for example R7,04/US$. The indirect quote gives the number of units of the foreign currency needed to buy one unit of home currency, for example US$ 0,1419/R. The indirect quote is thus the reciprocal of the direct quote, and vice versa. Universal interbank quotations are usually stated in indirect quotation terms (Hough & Neuland 2007:159).

The cross rate is the exchange rate between two currencies, based on their common relationship with a third currency. The two currencies are usually quoted in a third

currency, usually the US$. The cross rate between South African rand and Swiss franc will thus be the South African rands per US$ divided by the Swiss francs per US$ (Hough & Neuland 2007:162).

All the countries in the world, to a greater or lesser extent, form part of the international trade and business environment. Financial and capital flows are subject to exchange rates due to international trade and investments. The conversion of currencies is facilitated by the foreign exchange market. Different foreign exchange mechanisms are very important to ensure the efficient functioning of the international financial and exchange markets (Hough & Neuland 2007:159–160).

3.6.1 Foreign exchange mechanisms

In international finance, spot transactions, forward transactions and currency swaps are important foreign exchange mechanisms (Hough & Neuland 2007:160–162).

A *spot transaction* involves the purchase of foreign exchange with payment and delivery within two business days. The *spot rate* is the price at which one currency trades for another currency in a spot exchange transaction. A *forward exchange rate* is the agreed upon price for a foreign exchange sale or purchase in the future. The benefit of the forward exchange market is that firms can contractually agree at present on a fixed future exchange rate. Thereby they eliminate the risk of unfavourable exchange rate movements. A *currency swap* is a sophisticated forward exchange transaction, where a given amount of foreign exchange is bought and sold at the same time for two different future dates. It allows firms to acquire long-term foreign financing at lower costs than would have been possible with direct borrowing (Hough & Neuland 2007:160–162; Brigham & Daves 2004:929–930; Brigham & Houston 1998:713).

When the assumption is made that perfect capital market mobility exists, all securities in the market system are perfect substitutes. Different currencies are involved, implying that existing exchange rates are expected to last for an indefinite period. The spot and forward exchange rates will then be identical (Mundell 1963:475–476). However, in the global capital market, spot and forward rates are not identical. According to Frankel and Froot (1987:150–151), exchange rate forecasts are also inelastic. The implication is that a current increase in the spot exchange rate will generate expectations of a future exchange rate decrease. This effect tends to moderate the extent of the initial exchange rate increase.

It was stated that international trade and investments are facilitated by the foreign exchange market. In this market, one currency can be transformed into another currency. The process of deciding how currencies will be converted is called *exchange rate determination* (Hough & Neuland 2007:164).

3.6.2 Exchange rate determination

Exchange rate determination is the process of deciding how one currency will be converted into another currency. In general, exchange rates are determined by the demand and supply of currencies relative to each other. Peoples' desires for foreign products, services and investments create the demand for a foreign currency. Correspondingly, producers' desires to sell their products and services create the supply of foreign currency (Hough & Neuland 2007:164; Brigham & Daves 2004:926).

Real, monetary and financial considerations interact in the determination of a country's exchange rate (Dornbusch 1980:1). The fundamental problem in business cycles worldwide is that exchange rate fluctuations are persistent and volatile. The general explanation for the fluctuations is that they result from the interaction between monetary shocks and sticky product prices, where prices are held fixed for a certain time period (Chari, Kehoe & McGrattan 2002:533).

Exchange rate depreciation is the decrease in the price/value of the domestic currency in terms of a foreign currency. The rate of exchange between the domestic country and the foreign country thus decreases. Exchange rate appreciation is an increase in the price/value of the domestic currency in terms of a foreign currency (Brigham & Daves 2004:926). When the exchange rate appreciates, it is often accompanied by an increase in the capital inflow to the domestic country as the profits will be more in the foreign currency. There will thus be more foreign capital available for financing purposes. The country's share market is consequently expected to boom, followed by a probable increase in the country's economic growth rate. However, policymakers are concerned that capital inflows, associated with exchange rate volatility, may have an adverse effect on the country's export sector (Calvo et al. 1993:109, 143).

The exchange rate system that a country uses impacts on the country's imports, exports and the flexibility of its monetary decisions. It also influences the monetary reaction on an exchange rate depreciation or appreciation (Brigham & Daves 2004). Two commonly used exchange rate systems will be considered in the next section.

3.6.3 Exchange rate systems

The two generally used exchange rate systems are the *fixed* and the *floating* exchange rate system. When a country has a *fixed exchange rate system*, the country maintains a constant exchange rate between currencies. An exchange rate increase is then called a *revaluation*, rather than an appreciation, and an exchange rate decrease is called a *devaluation*, instead of an exchange rate depreciation (Blanchard 2006:379; Brigham & Daves 2004:927).

When a *floating exchange rate system* is used, the exchange rate is allowed to move up or down according to demand and supply changes. The exchange rate is thus allowed to seek its own level without much government intervention. Variances in the exchange rate do not have such a large influence on the domestic prices or wages, compared to the fixed exchange rate system (Devereux & Engel 1998:4). However, the country's central bank sometimes intervenes in the market, by buying and selling its currency to smooth out exchange rate fluctuations. The reason for the interference is that the central bank may prefer to keep the average exchange rate at an appropriate level, in line with the government's economic policy (Brigham & Daves 2004:927; Brigham & Houston 1998:711; Mundell 1963:477).

Krugman (1986:3) stated that "pricing to the market" (PTM) may occur when the exchange rate changes. The general indication of PTM is that import prices fail to decrease in proportion to a currency increase, for example if the Rand appreciates with one Rand per dollar, import prices will only adjust with R0.60. However, it is not a definite sign that PMT is present whenever import prices fail to adjust in proportion to the increase in the exchange rate. Under PTM conditions, floating exchange rates are preferred to fixed exchange rates, since floating exchange rates allow for better consumption stabilisation and insulation against foreign monetary shocks. Friedman (1953) also argued that flexible, floating exchange rates are preferable to fixed exchange rates based on the improved insulation that it provides against foreign shocks. Between the 1970s and the 2000s, South Africa used various exchange rate systems. The various regimes as well as the current system are discussed in the following section.

3.6.3.1 The South African exchange rate regimes

The SARB followed different exchange rate regimes during the 1970s to the 2000s. During 1970 to 1979, the rand was pegged to the US dollar or the pound sterling. From

1979 to 1983, a managed float, dual exchange rate system was used. Between 1983 and 1985, a unified exchange rate system was in place. For the period 1985 to 1994, the SARB returned to the dual system. In 1995, there was a unification to a managed floating rand, and since 2000, the rand is free floating (Aron & Meullbauer 2002; Jonsson 2001:244). Although the authorities would prefer to have greater exchange rate stability, they rightfully realise that under the current conditions, periodic exchange rate fluctuations are unavoidable (Van der Merwe 2004:9).

The question of whether the exchange rate system matters for a variety of economic activities and decisions is a far-reaching concern in existing finance literature (Reinhart & Rogoff 2004:37; Devereux & Engel 1998:1). The general assumption is that exchange rate changes have important implications for the profitability of firms, as measured by their share returns, as well as their financial decision-making (Dominguez & Tesar 2006:189). The selection of a country's exchange rate system, as well its effectiveness, is thus a very important decision that impacts on all the entities within the economy (Flood 1979:413).

3.6.4 Exchange rate effectiveness, predictability and the international Fisher effect

In order to examine the effectiveness of an exchange rate arrangement, specific information is required, namely the effect of foreign exchange intervention and capital control on the exchange rate, as well as the extent to which interest rates are used to stabilise the country's exchange rate (Reinhart & Rogoff 2004:26).

Real interest rates and real exchange rates are linked by international parity conditions (Meese & Rogoff 1988:942). The international Fisher effect embodies the relationship between the exchange rate, the interest rate and the inflation rate. It states that for any two countries, the spot exchange rate should change with the same amount, but in the opposite direction as the difference in the nominal interest rates between the two countries (Hough & Neuland 2007:166). For instance, if the expected South African interest rate is 8%, it is higher than the supposed Swiss interest rate of 2%. It thus reflects relatively higher expected inflation rates for South Africa compared to Switzerland. The value of the rand should then decrease by 6% (8% - 2%) against the Swiss franc over the specific period (Hough & Neuland 2007:166).

The statement can be made that, if the exchange rate and its influential factors can be predicted, firms will be enabled to do better financial forecasting. This could impact on the firm's capital structure. Mark (1995:214–215) stated that there is an economically noteworthy predictable component in long-term exchange rates. He declared that systematic exchange rate movements, determined by economic fundamental factors, lead to a gradual adjustment in exchange rates. This adjustment is in response to nominal or real market shocks. His finding is important, since it has long been thought that exchange rates are unpredictable. The predictability of exchange rates can thus have an important impact on firms' financing decisions.

3.6.5 The effect of the exchange rate on capital structure

The exchange rate has a profound effect on a country's price level, as well as its imports and exports. When a country experiences high inflation, the central bank may attempt to raise the value of its currency. The central task of every country's monetary system is to keep inflation down by increasing the value of the country's currency and simultaneously encouraging economic growth (Brigham & Daves 2004:926–267).

A country's domestic employment can also be influenced by an increase or a decrease in its domestic production. When a country experiences an unemployment problem, the central bank often lowers its interest rates. Investors will tend to take their capital to other countries that offer higher interest rates on investments. The consequent capital flight leads to a sale of the country's currency, which will cause a decline in the currency's value. The country's products and services will then be cheaper in the world market, stimulating exports, domestic production and consequently domestic employment. Over time, exchange rate depreciation thus leads to an increase in exports and a decrease in imports (Blanchard 2006:409). However, if a country uses a floating exchange rate system, the intervention will only have a temporary effect, since market forces will prevail in the long run (Brigham & Daves 2004:927).

Exchange rates can thus, through its effect on domestic prices, affect a country's attractiveness to investors. The marginal profitability of investments is influenced by changes in total production costs due to exchange rate changes. When a country's investment opportunities are unfavourable due to low interest rates, investors will prefer not to invest in the country. This will lead to a decrease in the foreign capital that is available to firms (Campa & Goldberg 1999:293–294). However, currency depreciation

can be accompanied by a systematic increase in the foreign direct investment (FDI) in the country in the long run, since it gives investors a long-term edge in obtaining control of a firm's productive assets by receiving a higher amount of the domestic currency for their foreign capital (Froot & Stein 1991:1215).

When a firm borrows money from a foreign investor, the firm also has to consider the exchange rate risk. This risk refers to the uncertainty in returns due to exchange rate movements between the South African rand and a foreign currency (Dominguez & Tesar 2006:189). The firm should therefore consider the possible increase in the return on its loan when it conducts long-term financial planning (Bodie et al. 2003:726–729).

Firms and investors can hedge themselves against exchange rate risk. Investors often hold equity portfolios to hedge themselves against inflation risk and purchasing power parity (PPP) deviations. PPP theory states that the exchange rate between two currencies adjusts to reveal the difference in the price level between the two countries. However, it is important to note that PPP deviations, solely stemming from changes in the nominal exchange rate without an inflation risk, cannot explain the domestic bias for holding equity portfolios (Hough & Neuland 2007:164; Cooper & Kaplanis 1994:46).

Greater exchange rate flexibility is often advocated in order to give firms and banks stronger incentives to hedge their financial positions (Eishengreen & Hausmann 1999:24–25). The optimal hedge in a currency is generally not equal in value but has an opposite sign than the firm's expected currency exposure. The firm's managers and not the shareholders decide on the firm's hedging policy. However, the shareholders will select managerial compensation contracts that will ensure the maximisation of the firm's value as well as the shareholders' value (Stulz 1984:127–128).

Through the discussion on the economic variables, it was indicated that these variables impact on each other. In the following section, the combined impacts of the economic variables on each other as well as on firms' capital structure decisions are discussed within the South African context.

3.7 The combined impact of the South African monetary policy on the economic variables

South Africa adopted a formal inflation-targeting monetary policy framework in 2000, following on less satisfactory results with previous monetary policy regimes. A

continuous inflation target between 3% and 6% was determined for the period beyond 2006 (Jonsson 2001:243; Van der Merwe 2004:6). The main instrument that the SARB uses to target inflation is the repo rate. This is the rate that the SARB charges for borrowed cash reserves. When the SARB changes the repo rate, it initiates a series of economic events. This chain of economic developments is referred to as the "transmission mechanism of monetary policy" (Smal & De Jager 2001:5–6).

The repo rate thus has direct effects on other economic variables, such as the interest rate, inflation rate, exchange rate, the demand for and supply of products and services, as well as investment and spending decisions through the monetary policy transmission mechanism (Smal & De Jager 2001:5–6). These effects are illustrated in Figure 3.5.

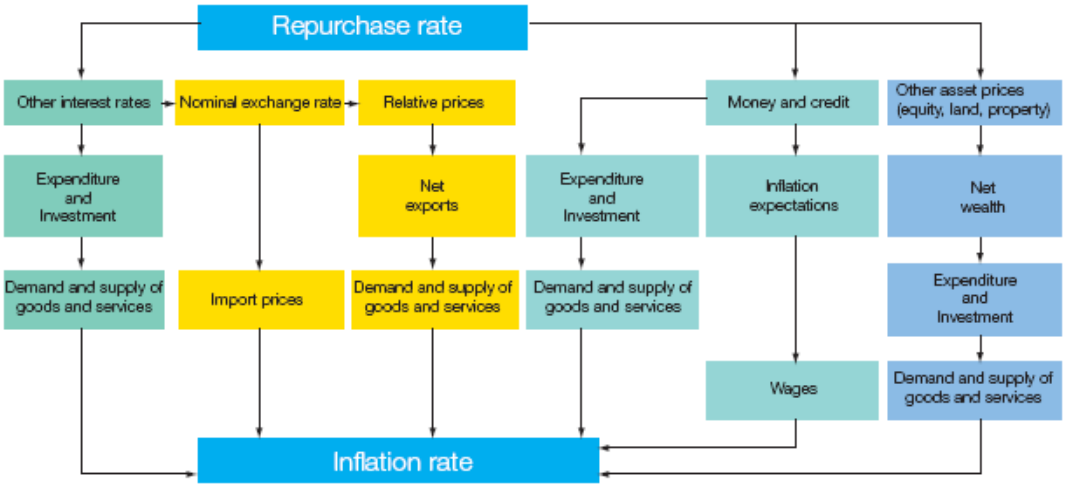

Figure 3.5: The monetary policy transmission mechanism

Source: Smal & De Jager (2001:5)

The repo rate is the most significant rate in the financial markets. Changes in monetary policy should first affect the interbank rates at which the central bank borrows to private banks, which then impacts on similar money market rates and finally affects the economy's interest rates. The repo rate thereby ensures effective pricing in the money market as a whole (De Angelis et al. 2005:657–660).

Changes in the repo rate also affect the demand and supply for products and services. The pressure for demand relative to the economy's supply capacity is the key factor that influences domestic inflationary pressures. Inflation is, amongst others, the consequence of economic pressures that have originated in the labour and/or product and service

markets. It is also a result of imported inflation that is influenced by fluctuations in the exchange rate (Smal & De Jager 2001:5).

When interest rates are high, it is likely that there will be an increase in short-term capital inflow in the country. However, due to the fact that it is short-term, the increase is likely to increase exchange rate volatility as well (Edwards 1998:63). The immediate effect of exchange rate movements is discounted by taking in consideration their inflationary effect 18 months into the future. The aim is to respond accordingly, instead of attempting to neutralise the effect immediately (Van den Heever 2001:174).

Inflation targeting allows for moderate exchange rate flexibility to stabilise foreign sector shocks. However, it can also lead to a depreciation of the currency, which will increase inflation, at least in the short run. South Africa's inflation target has been challenged by a variety of external shocks that lead to real exchange rate depreciations after 2000. However, these depreciations were largely outside the control of the monetary policy (Woglom 2003:2; 24). According to Khabo and Harmse (2005:360), it appears that an exchange rate appreciation leads to a decrease in the inflation rate, which results in an interest rate decrease.

Exchange rate changes could thus have important effects on inflation. Exchange rate movements are even more important in small economies, such as South Africa, than in advanced industrialised countries, as these movements are likely to have a proportionally larger impact on the product prices of the developing countries (Van der Merwe 2004:8). However, some economists argue that moderate inflation rates of below 8% do not have significantly negative effects on economic growth (Van der Merwe 2004:12). Economic growth is important for the economic development of a country. The South African Growth, Employment and Redistribution programme (GEAR) was introduced in 1996, predicting the necessary average growth rates to increase employment and living standards within South Africa (Weeks 1999:796).

Critics of South Africa's monetary policy framework argue that it is too restrictive (Aron & Meullbauer 2005). The framework is believed to be responsible for relatively high domestic interest rates, which discourage investment and economic growth (Khabo & Harmse 2005:349). The conventional perception is that an increase in interest rates affects output and GDP with a lag of several quarters (Aron & Meullbauer 2002:185). South Africa experiences a lack in sustained economic growth. The country's domestic

investment rates and levels of FDI are also relatively low. Despite the fact that South Africa has a relatively attractive investment climate, it attracts only a small portion of the FDI directed to developing markets (Lewis 2002).

3.8 Summary

In this chapter, different economic variables as well as their impact on capital structure were discussed. The economic factors of concern to this study are the economic growth rate, the interest rate, the inflation rate and the R/$ exchange rate.

Firms have to consider a country's economic growth rate and the level of economic development in order to evaluate profitable opportunities within the country. Economic growth is defined as the increase in the capacity of an economy to produce products and services in the long run, and this is measured by the gross domestic product (GDP) (Hough & Neuland 2007). The critical factors that influence a country's GDP are technological innovation, population growth and domestic savings (Kaldor 1957:591). South Africa is classified as a developing country with moderately efficient technology, increasing human development and a developing financial sector (World Bank 2009; Hough & Neuland 2007:131).

However, in finance literature, there exists a debate on the relationship between economic growth, finance and capital structure. Some researchers indicate that the banking system can improve economic growth by the funding of productive opportunities, often with debt financing (Levine & Zervos 1998:537). However, others state that the impact of a country's financial system on its economic growth is overstated (Lucas 1988:6). Firms can also use equity as a financing source. Improved share market liquidity will improve longer-term share investments. Longer-term, high-return investments are important, since it enhances economic growth (Levine 1991).

A country's interest rate level is another important consideration for firms, since it determines the cost of debt financing. Irving Fisher formulated the Fisher equation, indicating that the nominal interest rate in a country is equal to the real interest rate plus the expected inflation premium (Mishkin 1984:1346). The economic determination of interest rates indicates that the equilibrium interest rate is determined and influenced by the demand for and supply of money (Blanchard 2006). There are also other factors that

can have an influence on the interest rate, such as a budget deficit (Brigham & Houston 1998:141).

Firms will logically tend to use debt financing if the interest rate is favourable. When firms use debt financing, they should consider different debt provisions, such as the timing of the debt payments. If a firm fails to meet its legal debt requirements, equity can be issued in order to compensate debt holders for any financial losses (Scott 1977:5; Merton 1974:449).

In South Africa, the repo rate is the interest rate that the SARB charges for borrowed cash reserves. The SARB uses this rate to influence the country's liquidity conditions and other interest rates. It is also the main instrument used for inflation targeting (Nowak & Ricci 2005:4; Smal & De Jager 2001:5–6).

Since 2000, South Africa uses a formal inflation-targeting monetary policy framework with a set inflation target between 3% and 6% (Jonsson 2001:243). Inflation is the sustained increase in the general level of prices within an economy. It is measured by the consumer price index (CPI). Inflation uncertainty can have a negative effect on firms' investment and financing decisions as well as on the country's economic growth. However, inflation can also be beneficial to a firm when it impacts on the tax as well as the real interest and wage rates payable (Hough & Neuland 2007:136–137; Blanchard 2006; Higgins 1981:36–37; Chen & Boness 1975).

A firm is expected to increase its debt financing during an inflationary period, since the real cost of debt financing will decrease due to the Fisher effect. Traditionally, equity was regarded to be a hedge against inflation. However, inflation decreases shareholders' returns, since it has a negative tax effect. Less distributable profits will thus be available for dividend payments. It can be valuable for firms to consider both the current and forecasted inflation rates when they evaluate the different financing sources (DeAngelo & Masulis 1980; Modigliani & Cohn 1979:24–27).

The exchange rate specifies the number of units of a country's currency that can be bought with one unit of another country's currency (Brigham & Houston 1998:706). Countries normally use either a fixed or a floating exchange rate system. South Africa follows a floating exchange rate system where the exchange rate is allowed to find its own equilibrium with minimal government intervention (Aron & Meullbauer 2002; Quirk, Christensen, Huh & Sasaki 1987).

The exchange rate can influence the amount of debt and equity that firms use. Through its effect on domestic prices and interest rates, the exchange rate can influence the amount of foreign debt financing available to firms (Campa & Goldberg 1999:293–294). Investors can also hold equity portfolios to hedge themselves against possible exchange rate volatility and inflation risk (Cooper & Kaplanis 1994:46).

The “monetary policy transmission mechanism” was used to indicate the combined effect of the repo rate on the other economic variables (Smal & De Jager 2001:5–6). Critics of South Africa's monetary policy framework argue that it is too restrictive, since it is believed to lead to high interest rates, that influence inflation and discourage investment and economic growth (Aron & Meullbauer 2005; Khabo & Harmse 2005:349).

South Africa has the ideal monetary environment to study the effect of different economic variables on capital structure, due to the consistent variation in the growth rate, interest rate, inflation rate and exchange rate over time. However, from the preceding discussion it appears that relatively limited studies have so far considered the effect of changes in economic variables on the capital structure of firms, especially in South Africa.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

In the previous chapter, the effect of the changes in the economic environment and economic variables (the exchange rate, interest rate, inflation rate and the economic growth rate) on capital structure was discussed. In South Africa, there is constant variation in these variables, thus providing the ideal environment to study the effect of these variables on the capital structures of firms over time. It would appear, however, that only limited research was conducted in South Africa and other developing countries concerning the relationship among these variables.

The objective of this study is to determine whether the capital structures of listed industrial sector firms are influenced by the continuous changes in the South African economy. This chapter provides a description of the research methodology that was used to observe the relationship between the economic variables and firms' capital structures.

The remainder of this chapter consists of eight sections. The first section provides an introduction to business research. The second section explains deductive and inductive research approaches. In the third section, different research designs and strategies are indicated. The fourth section explains the secondary data analysis conducted in this study. The study's sample will also be indicated. The hypotheses are stated in the fifth section. In the sixth section, the usage of various descriptive statistics will be explained. The seventh section indicates the study's dependent and independent variables, as well as the measures used to quantify them. The final section of this chapter provides a summary on the research methodology.

4.2 Business research

Firms operate within a business environment that is fast changing, and the need thus exists for cost-effective, correct information to accomplish timely decision-making. Business research is a practical activity intended to observe aspects about business

matters in a systematic manner. The rationale is to increase knowledge and understanding by providing reliable procedures to help managers solve business problems. It also intends to provide managers with appropriate information that can serve as a basis for sound, timely decision-making (Coldwell & Herbst 2004:1).

Coldwell and Herbst (2004:2–3) stated that, if problem solving is done systematically, it could lead to better results. They indicated that the systematic research process consists of three steps. The first step entails the decision of what the researcher wants to achieve. This study's research objectives are indicated in Chapter 1. The second step involves the collection of appropriate information. This was done by collecting data from the McGregor BFA data base (2009) in order to calculate various financial ratios. Economical data was collected from the South African Reserve Bank (SARB) and the South African Revenue Service (SARS) (2008). Thirdly, the collected information should be analysed to arrive at a conclusion/decision. The data is analysed in Chapter 5, and the conclusion is set out in Chapter 6. However, every observation and interpretation is prone to error, therefore the research process is repetitive and continuous as researchers search for a "more rigorous truth" (Ghauri, Gronhaug & Kristianslund 1999).

4.3 Deductive and inductive research approaches

In research, there are two broad measures of reasoning, namely the *deductive* and *inductive* approaches. A study can also be *abductive* when the researcher uses a combination of the two approaches (Eriksson & Hede 2000). The *deductive* approach proceeds from a general to a more specific approach. This approach can also be described as *top-down*. It starts with theory on the research topic, followed by testable hypotheses. Observations are then made to address the hypotheses in order to enable the researcher to confirm or contradict the original theory (Trochim 2006). This approach is illustrated in Figure 4.1.

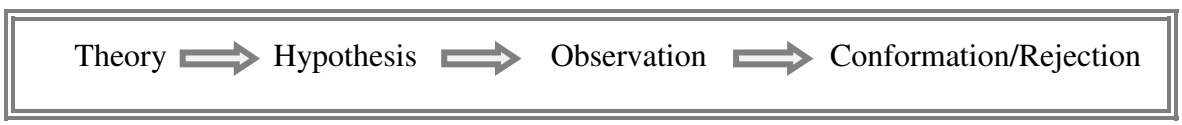

Figure 4.1: The deductive reasoning approach

Source: Trochim (2006)

Inductive reasoning is the opposite of deductive reasoning, where the researcher moves from specific observations to broader theories. This type of reasoning starts with specific observations. Tentative hypotheses are then formulated and finally a general theory is developed. This method can be described as a *bottom-up* approach (Trochim 2006). The approach is illustrated in Figure 4.2.

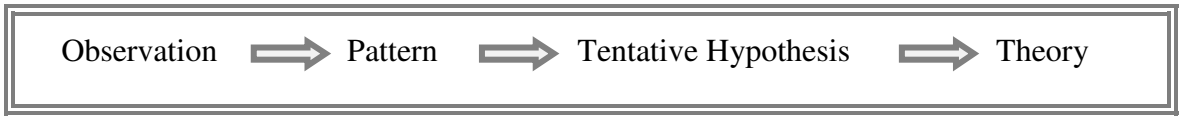

Figure 4.2: The inductive reasoning approach

Source: Trochim (2006)

This study tends to follow a deductive approach, since the research question and hypothesis are based on theory and are thus of a deductive nature. In Chapter 5, observations will be made in order to confirm or reject the stated hypotheses.

4.4 Research strategies, design and approaches

Various research strategies, designs and approaches can be used when conducting research. These various methods and the selected strategy, design and approach used for this study will be discussed in the following section.

4.4.1 Research strategies and design

A study's research strategy is used to structure the research process and to indicate how all the components collaborate in order to address the research question (Trochim 2006). A research design is the strategy for the study and the plan by which the strategy is to be carried out (Coldwell & Herbst 2004:37–38). The research design used to conduct a study depends on the researcher's knowledge about the problem and how well the problem is structured and formulated (Eriksson & Hede 2000).

An efficient research design should comply with the following criteria. Firstly, it must be experimental by nature, since the further away the design moves from being experimental, the more difficult it is to accept the validity of its findings. Secondly, efficient research designs have built-in flexibility to adapt to different circumstances. Thirdly, the research design must be feasible for implementation. It is important to note that these criteria are only indicative of a good research design and it can be

individually tailored according to the needs of different research areas (Coldwell & Herbst 2004:37–38).

There are three different types of research strategies, namely *descriptive*, *exploratory* and *causal* research strategies. The main purpose of *descriptive* research is to describe the characteristics of an event or a population. It intends to answer "who, what, when and where" questions. In this case, the researcher has already identified or understands the underlying relationship(s) of the problem at hand (Coldwell & Herbst 2004:9–11).

The approach of *exploratory* research is to find a hypothesis to be tested, and it does not start with a specific research problem. The purpose is to determine whether or not an event occurred and to gain familiarity with it. However, it does not aim to compare it with other events. Exploratory research may also serve as investigation if the research area is vague or new (Coldwell & Herbst 2004:10–11; Welman & Kruger 1999).

Causal research is based on the assumption that the variable to be predicted (the dependent variable) is casually related to one or more independent variables. Causal research aims at demonstrating that a change in one variable causes a predictable change in another variable. A *deterministic* relationship suggests that a particular variable will always lead to a certain change in another variable. A *probabilistic* relationship states that a change in one variable will make a certain outcome in another variable more probable. A *scientific* research approach maintains that it can never definitely be proven that one variable is the cause of another variable. It can only propose that such a relationship exists. Causal relationships are therefore always probabilistic (Coldwell & Herbst 2004:11–12).

A combination of the descriptive and causal research strategies was used in this study. Descriptive research was used to determine the nature and characteristics of the data set's firm-specific and economic variables. Causal research was used in an attempt to determine the effect of various economic events (the independent variables) on the capital structure of firms (the dependent variable). The combined research strategy was advantageous, since it provided the researcher with sufficient explanations for the population's characteristics. The relation was probabilistic, indicating that a change in one variable made a change in another variable more probable. However, the researcher does not state that the dependent variable is the definite cause of the independent variable (Coldwell & Herbst 2004:9).

4.4.1.1 Validity of the research design

A major consideration for researchers is the internal and external validity of the results of the study. *Internal* validity is the validity of the conclusions made regarding the observed relationship. The main question is whether observed changes can be attributed to the direct cause and not to other possible variables that could impact on the relationship. Internal validity is only relevant to the specific study in question (Coldwell & Herbst 2004:40). Calder, Phillips and Tybout (1982:240) stated that internal validity deals with whether or not an observed covariance should be regarded as a causal relationship. *External* validity determines whether or not an observed relationship could be generalised across situations.

Two conflicting opinions exist regarding external validity. Some researchers state that it should be a priority in theoretical research. Research that is thus weak in external validity is believed not to be a sufficient theoretical test. A contrasting view is that when a researcher's observations are mainly theoretical, the assumption of external validity is of minor concern. External validity is then not necessary to accomplish an accurate theoretical test. Therefore, it may be forfeited in favour of addressing internal validity (Calder et al. 1982:240).

In this study, allowance was made for the fact that there are other possible factors that could have had an influence on the observed results. The internal validity was thus influenced, since it cannot definitely be stated that the observed changes were caused by the examined variables. In an attempt to increase the study's internal validity, McGregor BFA's (2009) standardised financial statement data was used instead of published financial statements, since published statements may differ among firms. Standardised financial data enabled the researcher to compare various firms over time. Concerning the external validity, it is important to note that only a sample of listed, industrial sector firms was considered. Mining and financial sector firms were excluded from the sample, since they differ in nature from the industrial sector firms. Industrial sector firms also often vary in size, which could possibly have an effect on their capital structures. It is thus difficult to generalise the findings across situations where all firms (including mining and financial sector firms) are studied, since these firms were not included in this study.

4.4.2 The research approaches

There are two main research approaches, namely *qualitative* and *quantitative* approaches (Coldwell & Herbst 2004:13).

4.4.2.1 Qualitative research approach

Information is believed to be qualitative if it cannot be analysed by means of mathematical techniques. It could also imply that an incident does not take place often enough to allow the collection of dependable data. Qualitative research can, for instance be used to reveal the opinions of respondents (Coldwell & Herbst 2004:13–14).

4.4.2.2 Quantitative research approach

Quantitative research involves the collection of primary data from individual units, often with the intention to project the results to a wider population (Martins, Laubser & Van Wyk 1996). Fundamentally, this approach offers a solution to problems by using numbers. Numbers provide a "universal language" that can be easily understood. This approach generally entails statistical analysis on observational/census data in order to test hypotheses and theories. Most financial problems can be almost completely described in numerical terms (Coldwell & Herbst 2004:15; Creswell 2002:18).

In this study, a quantitative research approach was used in order to test the hypotheses. Qualitative approaches were used, since this study was not aiming to test opinions. Financial data was collected from the McGregor BFA (2009) database in order to conduct statistical analyses.

4.5 Data analysis

4.5.1 Primary research

Primary research is defined as the original analysis of data in a research study. It typically involves the usage of statistical methods (Glass 1976:3). However, in this study existing data was used. No "new data" was collected.

4.5.2 Secondary data analysis

Secondary data analysis is conducted in order to achieve the study's objectives. It aims at re-analysing existing, mostly quantitative data in order to test hypotheses (Mouton 2001:164). Various academic publications were included in a comprehensive study of

the existing literature on the research question. Standardised financial statements from McGregor BFA (2009) and economical data obtained from the SARB and SARS (2008) were used to determine the possible effect of economic changes on South African industrial sector firms' capital structures.

The McGregor BFA database (2009) provides standardised, published financial statements for listed and delisted South African firms. It consists of a balance sheet, income statement, cash flow statement and sundry data items. These standardised financial statements are used to calculate various measures in order to compare firms. Different ratios were calculated for a sample of South African industrial firms that are listed on the Johannesburg Securities Exchange market (JSE Ltd) over the period 1989 to 2008.

4.5.3 The sample of the study

Coldwell and Herbst (2004:73) define a *population* as the group of items, units or people under investigation. A sample is obtained by collecting data only about some of the population's members. This is therefore the portion of the population that is selected for analysis. *Sampling* is the act of selecting a representative part of a population in order to determine the characteristics of the whole population (Coldwell & Herbst 2004:73–74). (The study's sample firms are provided in Appendix 1).

The reasons for sampling are as follows:

- It is more economical to observe a sample than to observe the entire population;
- The time factor of sampling is important, since the sample may faster provide the necessary information to the researcher;
- When the population is very large, a sample is often the only way to acquire the desired information; and
- The data collected from a sample can be more precise than the case would be if the whole population was investigated (Coldwell & Herbst 2004:74–75).

There are primarily two kinds of sampling techniques: the *probability* sample and the *non-probability* sample (Levine, Stephan, Krehbiel & Berenson 2001:2).

4.5.3.1 The probability sample

In a probability sample, the sampling subjects are chosen on the basis of known probabilities. It should be used whenever possible, because it allows the researcher to infer unbiased generalisations upon the population of interest. The four types of probability samples are the *simple random sample*, the *systematic sample*, the *stratified sample* and the *cluster sample* (Levine et al. 2001:10). The different types of non-probability samples are depicted in Figure 4.3.

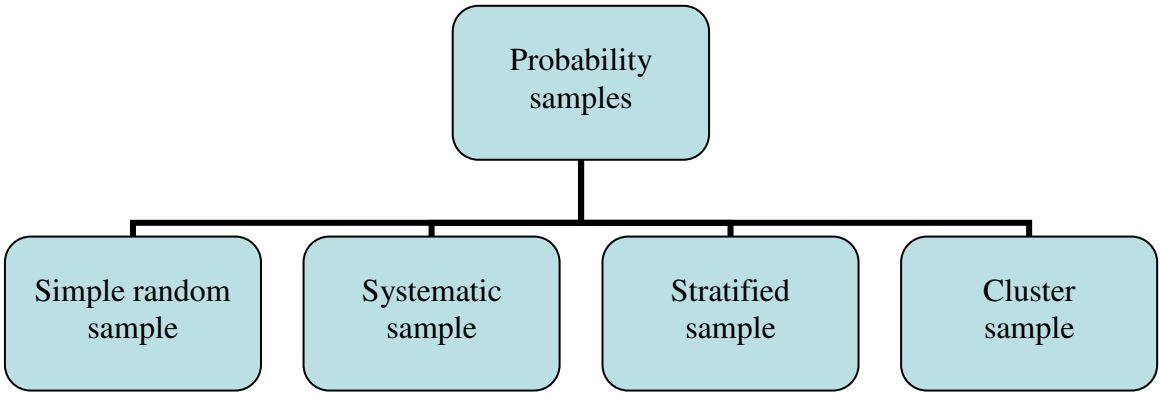

Figure 4.3: Types of probability samples

Source: Levine et al. (2001:10)

In a *simple random sample*, every individual item has the same selection probability. A systematic sample is obtained by choosing one unit on a random base. Additional elementary units are then chosen at evenly spaced intervals until the desired number of units is selected. When using a *stratified sample*, the population is divided into different stratums, based on certain characteristics. A simple random sample is then selected from each population stratum. In the *cluster sample*, the population is grouped into collective clusters based on their proximity to each other. Every cluster must be representative of the population. A sample is then drawn by randomly selecting one representative cluster (Coldwell & Herbst 20004:80; Levine et al. 2001:11–13).

4.5.3.2 The non-probability sample

In a *non-probability sample*, the individuals or items are chosen without considering their probability of occurrence. There are four main types of probability samples, namely the *judgement sample*, *quota sample*, *chunk/chain sample* and *convenience sample*. The advantages of non-probability samples include convenience and lower

costs. Conversely, the disadvantages are a lack of accuracy due to selection bias and a lack of generalisability of the findings (Levine et al. 2001:10). The different types of non-probability samples are depicted in Figure 4.4.

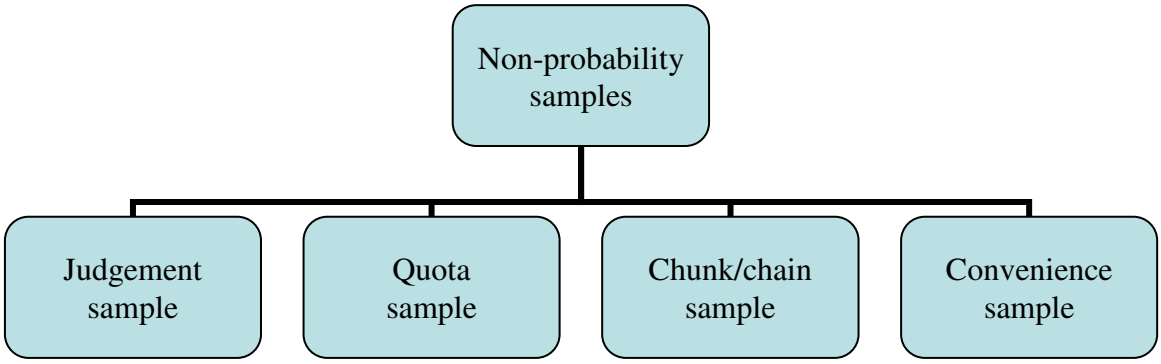

Figure 4.4: Types of non-probability samples

Source: Levine et al. (2001:10)

A *judgement sample* is obtained according to the judgement of a person that is familiar with the relevant population characteristics. The researcher thus judgementally selects elements to conform to a stated norm. In the *quota sample*, relevant characteristics are used to stratify the sample in order to improve the sample's representativeness. The *chunk/chain sample* identifies cases of interest from people who can indicate other people that could also be good sampling candidates. When such people are found, they can continue to tell the researcher where to find similar candidates and the chain effect will continue. In the *convenience sample*, sampling items are selected based on the fact that they are inexpensive, convenient and easy to allocate. The more "convenient units" are therefore selected from the population (Coldwell & Herbst 2004:81; Levine et al. 2001:10).

4.5.3.3 Choice of sampling

In this study, a *non-probability*, *judgement sampling method* was used. Only firms that had been listed on the JSE Ltd over the period 1989 to 2008 were selected to form part of the sample. Various economic changes were also considered during the study period, as reflected by the GDP, CPI, repo rate, R/$ exchange rate and the tax rate. These changes could possibly impact on the firms' financial decisions, as reflected by their published financial statements.

The format of published financial statements may vary among firms. Therefore, JSE Ltd data was considered, since standardised financial statement data was available for consecutive years. Financial statement data is available for industrial, mining and financial sector firms. However, only industrial sector firms were considered. The rationale for using only industrial sector firms was due to the nature of the mining and financial industries that differ from that of the industrial sector. Both listed and delisted firms were considered over the 20-year study period. A total of 471 listed firms and delisted firms (4 461 observations) were included in the complete data set.

Data should be available for consecutive years, in order to reflect the true nature of the data. Therefore, the firms' data was divided into firms with data available for less than five years, and firms with data available for five or more years. Only the firms with data available for five or more years were included in the study's data set. This resulted in 320 listed and delisted firms (4 172 observations) being included in the final sample.

Two sources of sample bias should be taken into consideration. Firstly, sample selection criteria are often biased towards the major listed firms. The sample may thus confine the aggregate industry leaders, but will probably not be representative of the average firm. All listed industrial sector firms were included, not only the top 40 firms. The aim was to avoid the first sample bias towards the major listed firms that would have led to unrealistically positive results. The second sample bias was that only listed industrial firms were examined. A study may therefore be representative of listed firms, but only embody a small proportion of the firms in a country (Rajan & Zingales 1995:1424). Considering the second sample bias, it should be noted that this study focused on industrial listed firms. An attempt was thus not made for the sample to be representative of all the firms in South Africa.

Survivorship bias also had to be considered. This refers to the tendency to exclude failed firms from a study, due to the fact that they no longer exist. It often causes a study's results to skew higher, since only firms that were successful enough to survive until the end of the study period were included (Pawley 2006:21). In this study, both listed and delisted firms were included in an attempt to reduce the survivorship bias. The results of the study were thus be less affected by the currently listed firms, since the inclusion of failed firms reduced the survivorship bias and consequent skewing of results.

4.6 Hypotheses

This study's primary objective was to determine whether a relationship exists between the capital structure of South African listed industrial sector firms and the changing economic environment. The following hypotheses were therefore formulated:

H_0: There is no relationship between the capital structures of South African listed industrial firms and the changing economical environment.

H_A: There is a relationship between the capital structures of South African listed industrial firms and the changing economical environment.

4.7 Data processing

The data was processed by using Excel, Statistica and SAS programmes. Descriptive statistics, the Kolmogorov-Smirnov test, the Mann-Whitney U test, the split-middle technique, correlation analyses and regression analyses were used to evaluate the relationship between the variables.

4.7.1 Descriptive statistics

Descriptive statistics are commonly used and focus on the collection, characterisation and summarisation of a data set. It includes measures of central tendency (such as the mean and median) and measures of variation (for example the standard deviation) (Coldwell & Herbst 2004:92; Levine et al. 2001:2). In this study, descriptive statistics was used to determine the nature of the data.

4.7.1.1 The mean

The *mean* is the arithmetic average of all the items in the data set. The mean is calculated by summing the values in a study (x) and dividing it by the number of observations (n).

The formula for the mean ($\bar{x}$) is: (4.1)

$$\bar{x} = \frac{\sum x}{n}$$

Where:

x = the study's values

n = number of observations

The usage of the mean is advantageous, because the concept of a mathematical average is easily understood. Every data set has only one mean which reflects all the values in the data set. The mean of various data sets is also useful to compare the data sets. A disadvantage is that the mean could be affected by extreme outlier values that do not represent the rest of the data set. If there are many outliers, the mean is thus not representative of the data set (Coldwell & Herbst 2004:103–104).

4.7.1.2 The median

The *median* is a single value that is the most central item in the data set. One half of the data items lay below the central point and one half lay above it. The median is determined by ascending or descending the data set. If the data set consists of an odd number of items, the middle value is the median. The median is the average of the two middle values if the data set consists of an even number of items. It has an advantage over the mean, since it is not affected by extreme outlier values. It is also easy to understand and calculate. A disadvantage is that the data must be arranged in an array before the median can be determined (Coldwell & Herbst 2004:103–104; Stapel 2009).

4.7.1.3 The data range

The *data range* is the simplest measure of the spread of data values around the mean. It indicates the values from the minimum to the maximum sample values. However, it has the disadvantage that extreme outlier values could distort its variability indication (Coldwell & Herbst 2004:104; Stapel 2009).

4.7.1.4 Variance and the standard deviation

The *standard deviation* and *variance* are the most useful measures of variability in a data set. The standard deviation is the positive square root of the variance. It is advantageous, since it determines with high accuracy where the data values of a frequency distribution data set are positioned in relation to the mean (Coldwell & Herbst 2004:104).

The formula for the variance (S^2) is (Levine & Stephan 2005:55):

$$S^2 = \frac{\sum(x - \bar{x})^2}{n - 1} \qquad (4.2)$$

Where:

$\bar{x}$ = the mean

x = different values in the study

n = number of observations

The formula for the standard deviation (S) is (Coldwell & Herbst 2004:104):

$$S = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} \quad (4.3)$$

The standard deviation reveals how closely all the various items are clustered around the mean of the data set. The following applies whenever the distribution is bell-shaped. One standard deviation away from the mean accounts for about 65 percent of the cases in the distribution. Two standard deviations away from the mean will account for roughly 95 percent of the cases. Three standard deviations away from the mean usually account for about 99 percent of the cases. When the items are tightly clustered and the bell-shaped curve is steep, the standard deviation is small. If the items are spread wide apart and the bell-shaped curve is relatively flat, the standard deviation is large (Coldwell & Herbst 2004:83; Niles 2009).

According to Trochim (2006), descriptive statistics are used to describe the basic characteristics of a study's data. Together with graphical analysis they form the basis of almost every quantitative data analysis.

4.7.1.5 Skewness and kurtosis

Apart from the mean and the variance, *skewness* and *kurtosis* are two other measures that can provide descriptive information about a distribution. Both skewness and kurtosis can be used to identify outlier values in a data set (Jobson 1991).

Skewness is a measure reflecting the degree to which a distribution is asymmetrical. The normal distribution is symmetrical, resulting in two reflecting images on both sides of the middle of the distribution. When a distribution is asymmetrical, a disproportionate number of scores fall either to the left or the right side of the distribution. A distribution can be negatively skewed to the left, when the majority of values fall in the right side of the distribution. The "tail" of the distribution is thus on the left. A distribution is positively skewed when the majority of values fall in the left side of the distribution with the "tail" to the right (Sheskin 2004:15–17).

As a rule, skewness is often interpreted in terms of the positions of the mean and the median values. In a symmetrical distribution, the mean and median will have the same value. In a negatively skewed distribution, the mean will have the lowest value, followed by the median. In a positively skewed distribution, the mean will have the highest value, followed by the median (Sheskin 2004:18). However, the "median-mean rule" often fails in multimodal distributions or distributions where one tail is long but the other is heavy (Von Hippel 2005).

A perfectly symmetrical distribution will have a skewness value of zero. Positively skewed distributions will have positive skewness values while negatively skewed distributions will have negative skewness values (Lomax 2000:73). However, the skewness statistics cannot be used to interpret how skewed a distribution is, since it has no upper or lower limits (De Vaus 2002:227).

Kurtosis is the degree of peakedness of a distribution. It is usually considered relative to a normal distribution. There are three main types of kurtosis distributions. These distributions are indicated in Figure 4.5. A normal distribution, which is not highly peaked or flat, is called *mesokurtic*, while a distribution with a relatively high peak is called *leptokurtic* and a flat-topped distribution is called *platykurtic* (Spiegel & Stephens 1999:116). A perfectly mesokurtic normal distribution has a kurtosis value of zero. Leptokurtic distributions have positive kurtosis values, while platykurtic distributions have negative kurtosis values (Lomax 2000:75).

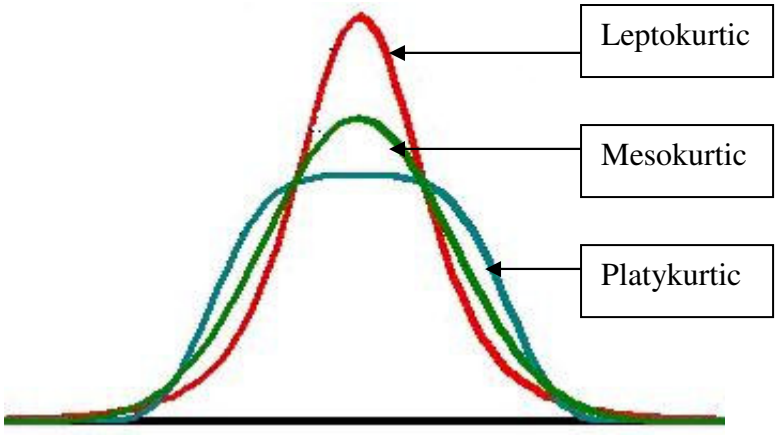

Figure 4.5: Kurtosis distributions

Source: Lomax (2000:74)

The following steps are followed to determine skewness and kurtosis (Corder & Foreman 2009:18):

- determine the sample's mean and standard deviation;
- determine the sample's skewness and kurtosis;
- calculate the standard errors of the skewness and the kurtosis;
- determine the z-scores for the skewness and the kurtosis; and
- compare the z-scores to the critical region obtained from the normal distribution. If the z-score is significant at the 10% level of significance or better, the sample has passed the normality assumption.

Skewness (S_k) is indicated by the following formula (Corder & Foreman 2009:18):

$$S_k = \frac{n}{(n-1)(n-2)} \sum \left(\frac{x_i - \bar{x}}{s} \right)^3 \tag{4.4}$$

The standard error (SE_{Sk}) of skewness is indicated by the following formula (Corder & Foreman 2009:18):

$$SE_{Sk} = \sqrt{\frac{6(n)(n-1)}{(n-2)(n+1)(n+3)}} \tag{4.5}$$

The mean $(\bar{x})$ and standard deviation (s) are used to determine the kurtosis (K) (Corder & Foreman 2009:18):

$$K = \left[\frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum \left(\frac{(x_i - \bar{x})}{s} \right)^4 \right] - \frac{3(n-1)^2}{(n-2)(n-3)} \tag{4.6}$$

The formula for the standard error of kurtosis (SE_K) is:

$$SE_K = \sqrt{\frac{24n(n-1)^2}{(n-2)(n-3)(n+5)(n+3)}} \tag{4.7}$$

Normality can be evaluated by using the z-score for skewness and the z-score for kurtosis.

The formula of the z-score for skewness is (Corder & Foreman 2009:18):

$$z_{sk} = \frac{S_K - 0}{SE_{Sk}} \quad (4.8)$$

The formula of the z-score for kurtosis is:

$$z_K = \frac{K - 0}{SE_K} \quad (4.9)$$

Skewness and kurtosis values are used as descriptive statistics to describe the shape of the distribution and as inferential statistics to indicate a possible deviation from normal distributions (Lomax 2000:75). These measures were of importance to this study, since outlier values could possibly distort the results of the study. It was thus important to identify the shape of the distribution, as well as possible deviation from the normality distribution. Non-parametric statistical tests are often used if the data set does not have a normal distribution (Corder & Foreman 2009). In sections 4.7.2 to 4.7.5 various non-parametric statistical tests are discussed. These tests will be used if the study's data set is found not to have a normal distribution.

4.7.2 The Kolmogorov-Smirnov goodness-of-fit test

Tests of "goodness of fit" consider the agreement between the distribution of a set of sample values and a theoretical distribution (Massey 1951:68). Researchers often want to demonstrate that a sample is derived from a specific type of distribution. The Kolmogorov-Smirnov goodness-of-fit test is used with continuous variables (Sheskin 2004:203; Kanji 1998). The test involves the comparison of the sample cumulative distribution function (CDF) with the theoretical CDF. If the sample data comes from the theoretical distribution, the two CDFs will be similar. However, the test rejects the null hypothesis of a "good fit" when the largest vertical distance between the theoretical and sample CDFs becomes too large (Van den Honert 1999:265).

The formula for the Kolmogorov-Smirnov d-statistic is (Lilliefors 1967:399):

$$d = \max_x \left| F^*(X) - S_n(X) \right| \quad (4.10)$$

Where:

$S_n(X)$ = sample cumulative distribution function

$F^*(X)$ = cumulative normal distribution function

The Kolmogorov-Smirnov test entails the statement of a null hypothesis and the determination of the level of significance. The d-test statistic is associated with a p-value. The determined p-value is then compared with the α-level (critical p-value) in order to reject or accept the hypothesis.

The following null hypothesis was stated:

H_0: there is no difference between the observed distribution of survey scores and a normally distributed empirical sample.

The level of significance associated with the null hypothesis was determined. A α-level of 0.05 was used. If the critical value is larger than the obtained probability estimate p, the null-hypothesis is not accepted. If the critical value is less than the obtained p-value, the null-hypothesis is accepted (Corder & Foreman 2009:32). In this study, rejection of the null hypothesis would have indicated that the data deviated from the normality distribution due to outlier firms. Non-parametric statistical tests should then have been used, since non-parametric tests are less sensitive to outlier values.

4.7.3 The Mann-Whitney U test

Various statistical methods can be used to compare data groups. The non-parametric Mann-Whitney U test is often used when datasets do not have a normal distribution. The test does not make restrictive assumptions about the shape of the population distribution and it is generally easy to apply and interpret (Coldwell & Herbst 2004:118–119; Levine et al. 2001:483).

The Mann-Whitney U test is used to compare the relative locations of two populations, based on independent samples. The test is used to find the differences between the medians of two populations (Coldwell & Herbst 2004:93; Levine et al. 2001:483). The test procedure entails the ranking of n_1 and n_2 independent observations selected from two populations, A and B. The observations are ranked from the smallest rank (1) to the largest rank ($n_1 + n_2$). The rankings are then tied and averaged. The average rank value is assigned to each of the tied observations. The sum of the ranks of sample A (T_A) and sample B (T_B) are then calculated. These ranked sums are used to construct the test statistic (Coldwell & Herbst 2004:118–119).

The formula for the Mann-Whitney U test statistic U_A is (Coldwell & Herbst 2004:119):

$$U_A = n_1 n_2 + \frac{n_1(n_1+1)}{2} - T_A \quad (4.11)$$

The formula for the Mann-Whitney U test statistic U_B is (Coldwell & Herbst 2004:119):

$$U_B = n_1 n_2 + \frac{n_1(n_1+1)}{2} - T_B \quad (4.12)$$

To establish whether there is a significant difference between the samples, the probability of obtaining the two values of U when there is in fact no difference between the populations should be determined (Hinton 2004:219). The p-value answers the question: if the populations actually have the same median, what is the possibility that random sampling would result in medians as far apart as observed by the experiment? If the sums of the ranks are very different, the p-value will be small. A small p-value leads to the rejection of the notion that the difference in medians is a coincidence. The conclusion can then be made that the populations have different medians. However, if the p-value is large, the conclusion cannot be made that the overall medians differ. It is not the same as stating that the medians are the same. There are just not compelling evidence for a difference (Sheskin 2004:423; Motulsky 1999).

In this study, the Mann-Whitney U test was used to compare the median values of all the firms between 1989 to 1994 and all the firms after 1994. A significance level of 0.05 was used. In this study, if the result of the test statistic would be significant (the determined p-value is less than the level of significance), it would indicate that there was a significant difference between the medians of the two samples. As a result of the latter, the conclusion could then be made that the samples possibly represented populations with different median values.

4.7.4 The split-middle technique

A method that is often used for determining trends in data sets is the split-middle technique, introduced by White (1974). It is applied to data sets within phases (Chafouleas, Riley-Tillman & Sugai 2007:132). White's split-middle technique aims to quantify improvements from baseline to intervention phase performances in the presence of a pre-existing base-line trend (Parker & Hagen-Burke 2007:920).

This technique is appropriate for the examination of trend comparisons across several phases. It evaluates the rate of behavioural changes over the course of various phases by plotting linear trend lines. The differing slopes of these lines are then compared. The

statistical evaluation involves the projection of linear trend lines of baseline data into an intervention phase. A binomial test is then used to determine whether the number of data points in the intervention phase fall above or below the projected line of the baseline (Sharpe & Koperwas 2003:275–276).

The split-middle test requires several observations within two or more separate experimental phases in order to compute trend lines for comparison purposes. The observations in each phase should also be evenly spaced in terms of the timing of the observations (Sharpe & Koperwas 2003:276). In this study, the split-middle technique was used to determine the trend in the data set before and after 1994. The median debt/equity (D/E) data, evenly spaced in yearly observations, was used. Trend lines were drawn in order to compare the differing slopes of these lines.

4.7.5 Correlation analysis

Correlations are regarded to be amongst the most general and functional statistics. A correlation is a single number that portrays the relationship between variables (Trochim 2006). It indicates whether variables are positively or negatively related, as well as the relative strength of the relationship. A disadvantage of correlation analysis is that it cannot be used to establish causation amongst variables. It can therefore not be stated that the change in one variable caused the change in another variable. The direction of the relationship is also indeterminate (Coldwell & Herbst 2004:107–109; Levine et al. 2001:138–140).

Two commonly used correlations are the Pearson product moment correlation and Spearman rank-order correlations. The Pearson correlation can establish relationships between two sets of continuous data, obtained from interval or ratio scales. It usually relies on strong assumptions. The non-parametric Spearman correlation determines the degree of association between sets of ranked data. It is less sensitive for outlier values (Coldwell & Herbst 2004:93). In this study, the Spearman correlation was used.

The formula for the Spearman correlation coefficient (r_s) is (Coldwell & Herbst 2004:120):

$$r_s = 1 - \frac{6\sum_{i-1}^{n} d_i^2}{n(n^2 - 1)} \qquad (4.13)$$

Where:

$d_i = x_i - y_i$ = the difference between the ranks of corresponding values X_i and Y_i

n = number of values in each data set

Non-parametric analysis is widely used in financial analyses when the normality of the data distribution cannot be assumed. It has the advantage of requiring modest prior information on the data-generating process. The non-parametric Spearman correlation relies on limited/no assumptions. Economic data often includes outliers and the Spearman correlation is less sensitive to the effect of these outlier values (Akritas & Politis 2003; Pallant 2007:109).

4.7.6 Regression analysis

Regression analysis is a stronger test than correlation analysis to measure the relationship between variables, in order to predict the behaviour of one variable from the other. Simple or multiple regressions can be conducted. In a *simple regression analysis*, an estimation equation is developed that relates an independent variable to a dependent variable. The relationship between the variables can be direct or inverse (Coldwell & Herbst 2004:106–107; 109).

Multiple regression analysis is the most widely used multivariate statistical technique. It is an extension of the simple regression technique and involves the estimation of the dependent variable by more than one independent variable in order to increase the accuracy of the estimate (Coldwell & Herbst 2004:109). In this study, a TSCSREG (time-series cross-section regression) procedure was used. This procedure regards panel data sets that consist of time-series observations on each of several cross-section units (Allen 1999). The regression model was thus appropriate for this study's data set, which consisted of both panel data and economical data. The procedure is based on a model used by Fan et al. (2008) to compare capital structures and debt maturity choices. They also included both panel data and economical data in their regression model.

The following regression equation was used (Allen 1999):

$$y_{it} = \sum_{k=1}^{K} X_{itk} \beta_k + u_{it} \qquad (4.14)$$

Where:

i = 1, . . ., N

t = 1, . . ., T

N = number of cross-sections

T = length of the time series for each cross-section

K = number of independent variables

y = dependent variable

x = independent variable

β = regression coefficients

μ = error term

4.7.7 Panel and longitudinal data

Longitudinal and panel data models and databases have taken on important roles in the literature on change analysis. Panel data is often referred to as *longitudinal data* in the natural sciences and *pooled cross-sectional time series* in the social sciences (Frees 2004:4–5). A distinction can be made between time-series data, cross-sectional data and panel data.

Researchers often compensate for a lack of time depth in their data series (less than 30 years) by collecting data cross-sectional for different firms. Time-series data consider different years of study for a specific variable, for example the return on equity (ROE) ratio for a firm between 2003 and 2007 (De Jager 2008:54).

Example of time-series data

	Firm 1
Year	ROE
2003	12%
2004	20%
2005	23%
2006	16%
2007	14%

Cross-sectional data study various explanatory variables in a specific year, such as the ROE ratio for four different firms in 2007 (De Jager 2008:54).

Example of cross-sectional data

	Firm 1	Firm 2	Firm 3	Firm 4
Year	ROE	ROE	ROE	ROE
2007	14%	20%	17%	23%

Panel data consider different variables over a period of time, for instance the ROE ratio for four firms between 2003 and 2007. It is thus able to measure time-series and cross-sectional effects (De Jager 2008:54–56).

Example of panel data

	Firm 1	Firm 2	Firm 3	Firm 4
Year	ROE	ROE	ROE	ROE
2003	12%	9%	15%	12%
2004	20%	11%	12%	10%
2005	23%	15%	10%	16%
2006	16%	18%	15%	19%
2007	14%	20%	17%	23%

Panel data refer to a data set with repeated observations over time for the same "individuals", such as industries, firms or countries. In aggregate panel data, time-series and cross-sectional measurements are often of a similar magnitude. A central issue is the accommodation of heterogeneity across units. Panel data may provide the exogenous variation that is necessary for the identification of structural parameters through comparing periods of policy changes. Other time-series data could also be used, but what is specific about panel data is the possibility of following the same "individuals" over time. Panel data thus facilitates the analysis of dynamic reactions and control unobserved heterogeneity (Arellano 2003:1–3).

Longitudinal data is a combination of time-series and regression analysis. It is composed of a cross section of many subjects, repeatedly observed over time. The repeated observations enable the researcher to directly study and effectively measure individual and pooled changes. It is more complex than time-series data. The primary motivation for the analysis is to examine the effect of an exogenous, explanatory variable on a response, controlling for the effect of other variables. Longitudinal data is

beneficial, since it enable the researcher to study cross-sectional and dynamic aspects of a research problem over time, as well as the heterogeneity/differences among various subjects. It is also simpler, since subjects can usually be assumed independently (Frees 2004:2; 5–8; Singer & Willett 2003:3; Diggle, Heagerty, Liang & Zeger 2002:1–2).

In this study, economical data and firm-specific data for listed and delisted industrial sector firms were observed over a 20-year study period. Various changes occurred during that period that could have influenced the observed variables. An analysis was thus made of the dynamic reactions of the variables, as well as the changes among the variables over time.

4.8 Variables

4.8.1 The dependent variable

A study's dependent variable is the variable to be foreseen. The dependent variable of this study was the firm's capital structure. This was indicated by the debt to equity (D/E) ratio. A firm's capital structure can consist of various components, including ordinary shares, reserves, minority interest, preference shares, long-term loan capital and current liabilities. The percentages of these components can vary over time. Therefore, the percentage ordinary shares (% OS), percentage reserves (% RES), percentage minority interest (% MIN), percentage preference shares (% PREF), percentage long-term debt (% LT DEBT) and the percentage short-term debt (% ST DEBT) are also calculated in order to investigate changes in these variables over time.

Empirical financial research generally relies on the book value rather than the market value of debt when evaluating capital structure. The majority of studies that consider bonds and equity together consider the book and not the market values of bonds (Sweeney, Warga & Winters 1997:5–6). Titman and Wessels (1988:7) considered both the market and the book values of equity. They only considered the book value of debt, but indicated, however, that the usage of market values would be preferable. Bowman (1980) indicated a high cross-sectional correlation between the market and book values of debt. According to him, possible misspecification due to using book values is thus relatively small. Furthermore, no correlations are suggested between the cross-sectional differences of the market and book values and any determinants of capital structure. No

apparent bias will this result from any possible misspecification of debt (Titman & Wessels 1988:7). In this study, the book values of debt and equity were considered.

The D/E ratio could be defined as follows:

$$\text{D/E} = \frac{\text{Total debt}}{\text{Total equity}} \tag{4.15}$$

Where:

Total debt = Total long-term loan capital + Total current liabilities

Total equity = Ordinary shares + Reserves + Preference shares

Firms' capital structures consist of different capital structure components that vary over time. These components are calculated as follows:

$$\%\,\text{OC} = \frac{\text{Ordinary shares}}{\text{Total capital}} \tag{4.16}$$

$$\%\,\text{RES} = \frac{\text{Reserves}}{\text{Total capital}} \tag{4.17}$$

$$\%\,\text{MIN} = \frac{\text{Minority interest}}{\text{Total capital}} \tag{4.18}$$

$$\%\,\text{PREF} = \frac{\text{Preference shares}}{\text{Total capital}} \tag{4.19}$$

$$\%\,\text{LT DEBT} = \frac{\text{Total long - term loan capital}}{\text{Total capital}} \tag{4.20}$$

$$\%\,\text{ST DEBT} = \frac{\text{Total current liabilities}}{\text{Total capital}} \tag{4.21}$$

Where:

Total capital = Total long-term loan capital + Total current liabilities + Ordinary shares + Reserves + Preference shares + Minority interest

4.8.2 The independent variables and notation used

This study focused on the effect of economic variables and changes in these variables on firms' capital structures. The independent variables were the growth rate, inflation rate, interest rate, exchange rate and the tax rate in South Africa during the period 1989

to 2008. It was evaluated by the following measures: GDP, CPI, the repo rate, the R/$ exchange rate and the tax rate.

The following notation is used throughout the remainder of this thesis:

GDP = annual growth rate of GDP (4.22)

CPI = annual inflation rate based on the CPI index (4.23)

Repo rate = annual repo rate (4.24)

R/$ exchange rate = annual R/$ exchange rate (4.25)

Tax rate = annual tax rate according to SARS (4.26)

Economic growth is measured by the gross domestic product (GDP). The GDP data were obtained from the SARB. The GDP used in this study was the gross value added (net output of an industry after adding all outputs and subtracting intermediate inputs) by all the resident producers in the economy plus any product taxes not included in the output valuation (Hough & Neuland 2007:126).

Inflation is measured by the consumer price index (CPI). The CPI rates are obtained from the SARB. CPI is defined as the price changes for all the products and services that the typical consumer buys (Hough & Neuland 2007:137). The interest rate is measured by the repo rate. The repo rates are obtained from the SARB. The repo rate is the rate that the SARB charges for borrowed cash reserves (Nowak & Ricci 2005).

The R/$ exchange rate was used in this study. It was obtained from the SARB. The exchange rate is defined as the number of units of a country's currency that can be bought with one unit of another country's currency (Brigham & Houston 1998:706).

The South African corporate tax rate was used in this study. Corporate tax is determined by the Minister of Finance in his budgetary speech. The tax rates are obtained from SARS (2008).

4.8.3 Measures of profitability

This study's secondary objective was to determine which capital structure model is followed by South African listed industrial firms. There are two generally used capital structure models, namely the *pecking order* and the *trade-off model*. These two models have contradicting results regarding the relationship between capital structure and profitability. The pecking order model states that there is a *negative* relationship

between the capital structure (as explained by the debt ratio) and profitability, while the trade-off model predicts a *positive* relationship (Tong & Green 2005).

Most previous studies that evaluated capital structure focused on the profitability measures return on assets (ROA) and return on equity (ROE). In this study, profitability was indicated by the following measures: ROA, ROE and ROA-ROE. The ROA-ROE inter-relationship was included to determine the combined effect of these two variables.

The profitability measures are calculated as follows:

$$\text{ROA} = \frac{\text{Trading profit} + \text{Total income on investment}}{\text{Total capital}} \tag{4.27}$$

$$\text{ROE} = \frac{\text{Trading profit} + \text{Total income on investment} - \text{Total interest paid}}{\text{Total equity}} \tag{4.28}$$

$$\text{ROA-ROE} = \text{ROA} - \text{ROE} \tag{4.29}$$

4.9 Summary

This chapter focused on the research methodology that was used in this study. Business research was defined as a practical, systematic activity to observe aspects about business matters in order to solve business problems in a timely manner (Coldwell & Herbst 2004). A deductive research approach was followed, where observations were made to address hypotheses (Trochim 2006).

Various research strategies, designs and approaches were indicated. The choice and description of the selected study method are very important, since these will impact on the results, the problem statement, as well as the validity of the study (Gölin & Withvoet 2001). The three mainly used types of research strategies are the *descriptive*, *exploratory* and *causal* research strategies (Coldwell & Herbst 2004). In this study, a combination of the descriptive and causal research strategies was used. The aim was to determine the effect of various economic events on the capital structure of industrial sector firms.

Qualitative or quantitative research approaches can be used. This study tended to follow a quantitative research approach. Standardised financial statement data, collected from the McGregor BFA database (2009) was used to conduct statistical analyses. The

study's internal and external validity was also addressed by considering comparable data for industrial sector firms.

Secondary data analysis was conducted, with the inclusion of various academic publications. Standardised financial statement data were used to calculate various book ratios for a sample of South African industrial firms that are listed on the Johannesburg Securities Exchange market (JSE Ltd) over the period 1989 to 2008.

The study's dependent variable was the firm's capital structure and this was indicated by the D/E ratio. The various components of debt and equity were also indicated. This study's independent variables were the different aspects of the changing economic environment. This was evaluated by the GDP, CPI, repo rate, R/$ exchange rate and the tax rate. The study's secondary objective was to determine which capital structure model was followed by South African listed industrial firms. The ROA, ROE and ROA-ROE ratios were thus used to examine the relationship between capital structure and profitability.

This study's null hypothesis stated that there is no relationship between the capital structure of a firm and the changing economic environment. The rejection of the null hypothesis would thus indicate a probable relationship between the economic variables and firms' capital structures. The data processing included descriptive statistics, the Kolmogorov-Smirnov test, the Mann-Whitney U test, the split-middle technique, correlation analyses and regression analyses. These were used to generate meaning from the collected data in order to reject or accept the stated hypotheses. In the following chapter, the results of the descriptive statistics and the statistical tests are presented.

CHAPTER 5

EMPIRICAL RESULTS

5.1 Introduction

In Chapter 4, the research methodology that was applied in this study was specified. A deductive research approach was followed where theory was tested to confirm or reject the hypotheses of the study (Trochim 2006). A combination of causal and descriptive research strategies was used, where the independent variables could probably explain a change in the dependent variable. Secondary research was conducted by using standardised financial statement data obtained from the McGregor BFA database (2009) to calculate the debt/equity ratio, the capital structure components as well as the profitability ratios ROA and ROE. The economic variables were obtained from the South African Reserve Bank (SARS) and South African Revenue Service (SARS) (2008).

This chapter investigates the relationship between the dependent variable (D/E ratio), the profitability ratios (ROA and ROE) and the economic variables (GDP, CPI, repo rate, R/$ exchange rate and tax rate). Possible relationships were analysed by using Excel, Statistica and SAS programmes. The results of the descriptive statistics, the Kolmogorov-Smirnov test, correlation analyses, regression analyses, the Mann-Whitney U test and the split-middle technique were used to evaluate the relationship between the variables, and to test the hypotheses stated in the first chapter.

The remainder of this chapter consists of seven sections. In the first section, the descriptive statistics for the dependent and independent variables are indicated. This is followed by the results of the Kolmogorov-Smirnov test for normality. In the third section, correlation analyses are used to determine possible relationships between the variables. In the fourth section, the results of the regression analyses are used to test the study's hypotheses. The regression analyses indicated differences in the obtained results before and after 1994. Therefore, the Mann-Whitney U test was used to determine whether the firms' median values before and after 1994 differed. The results of this test are provided in the fifth section. In the sixth section, the results of the split-middle

technique are used to evaluate trends in the data set. The final section provides a summary of the empirical results of the study.

5.2 Descriptive statistics analysis

Descriptive statistics are generally used to describe and summarise a study's data set (Coldwell & Herbst 2004:92). This consists of measures of location and measures of variability. The mean and median are measures of location. The data range and the standard deviation are measures of variability in the data set (Coldwell & Herbst 2004:103). Skewness and kurtosis are used to describe the shape of the distribution as well as possible deviation from the normal distribution (Lomax 2000:75).

Panel data refers to a data set with repeated observations over time for the same "individuals", such as firms (Arellano 2003:1–3). This study's firm-specific data can thus be categorised as panel data, since observations were made over a 20-year period for the same firms. Data should be available for consecutive years, in order to reflect the true nature of the data. Therefore, descriptive statistics were calculated for all the firms (with data available for five or more years) included in the sample.

5.2.1 The dependent variable

The descriptive statistics (mean, median, standard deviation, minimum value, maximum value, skewness and kurtosis) for the dependent variable are indicated in Table 5.1.

Table 5.1: Descriptive statistics for the dependent variable

Dependent variable	Mean	Median	Standard deviation	Minimum Value	Maximum value	Skewness	Kurtosis
D/E	1.827	0.968	12.819	-90.836	590.818	30.899	1239.957

The mean of the D/E ratio was positive and larger than one, indicating that there is more debt than equity in the firms' average capital structures. The median of the D/E ratio was positive and less than one, indicating that there was less debt than equity in the median firm's capital structure. The mean value of the D/E ratio was almost twice the value of the median. The median and the mean of the dependent variable (D/E) thus differed considerably. In order to investigate the differences between the mean and the

median values, the mean and median D/E values between 1989 and 2008 were plotted in Figure 5.1.

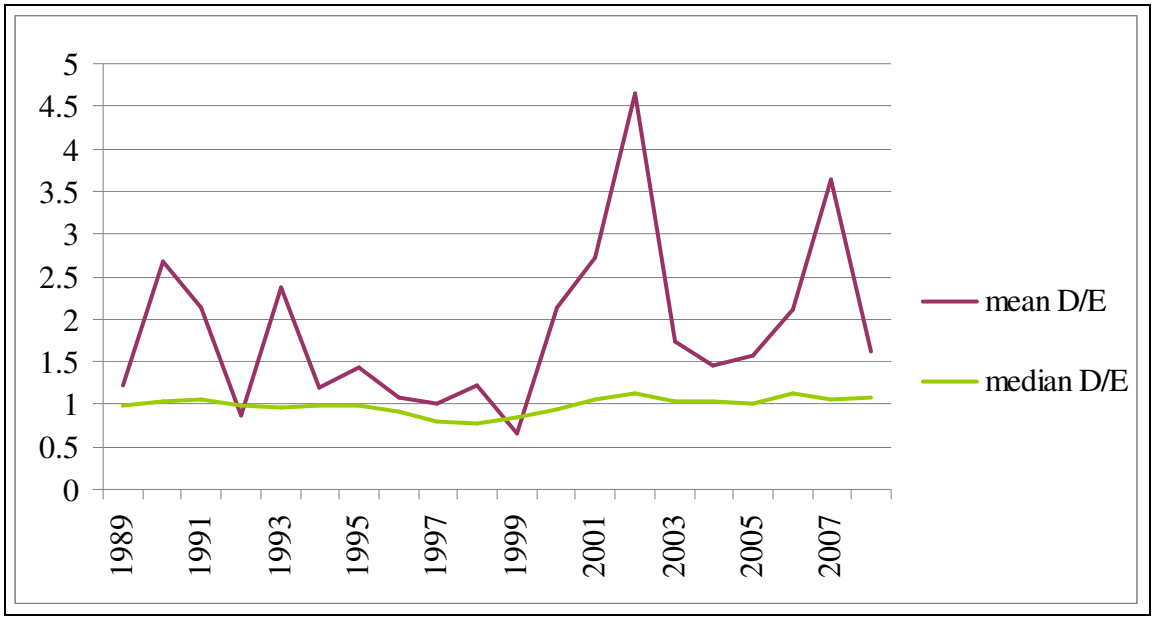

Figure 5.1: Average and median D/E values between 1989 and 2008

From Figure 5.1, it can be seen that the mean D/E ratio exhibited large changes over time. However, mean values are strongly influenced by outlier values. Therefore, a few firms with very high D/E ratios could distort the mean values. In contrast, median values are not influenced by extreme outlier values. These values revealed a smoother curve that varies around a value of one.

The D/E values ranged between a minimum value of -90.836 and a maximum value of 590.818. Rationally, it is expected that the minimum D/E value will be zero, since firms are not expected to have negative debt or equity usage. The negative value of -90.836 was thus an unusual capital structure observation. Firms' debt usage cannot be negative. However, a possible explanation for the negative D/E ratio is negative equity values due to share buybacks. The McGregor BFA database (2009) standardises financial statements and indicates share buybacks as a negative treasury shares item that forms part of the reserves. Therefore, since the reserves are negative, this could result in negative equity values. In the current study, 33 firms had negative D/E ratios.

The standard deviation of the D/E ratio was 12.819. If the data set has a normal distribution, one standard deviation away from the mean (-10.992 to 14.646) accounts for about 65 percent of the cases in the distribution. Two standard deviations (-23.811 to

27.465) away from the mean will account for 95 percent of the cases and three standard deviations (-36.630 to 40.284) away from the mean usually account for about 99 percent of the cases. D/E was positively skewed, where the mean has the highest value, followed by the median. The positive kurtosis value (1239.957) indicated a highly peaked leptokurtic distribution, which deviates from the normal distribution.

Mean values can be influenced by outlier values, which can thus give a distorted impression of the firms' average capital structures. Therefore, in this study, the non-parametric median values were considered instead of the mean values, since the median values are not affected by outlier values.

It should be considered that firms may use different forms of financing which could influence their D/E ratios. The following capital structure components were therefore considered: the percentage ordinary shareholders' equity (% OSE) (consisting of the percentage ordinary share capital and reserves), the percentage minority interest (% MIN), the percentage preference shares (% PREF), the percentage long-term debt (% LT DEBT) and the percentage short-term debt (% ST DEBT).

Although it was previously decided to use the median D/E ratio in this study, the mean D/E components were considered for this comparison. The rationale for using the mean values for this section was that the median values of the D/E components would exclude preference shares due to the exclusion of preference shares by the majority of the observed firms. Therefore, the median value would indicate that the preference share values were zero, while some firms do have preference shares, which is indicated by their mean values. The minority interest would also be indicated as zero, while in fact, some of the firms do have minority interest, as indicated by their mean values. The composition of the mean D/E ratio over the period 1989 to 2008 is illustrated in Figure 5.2.

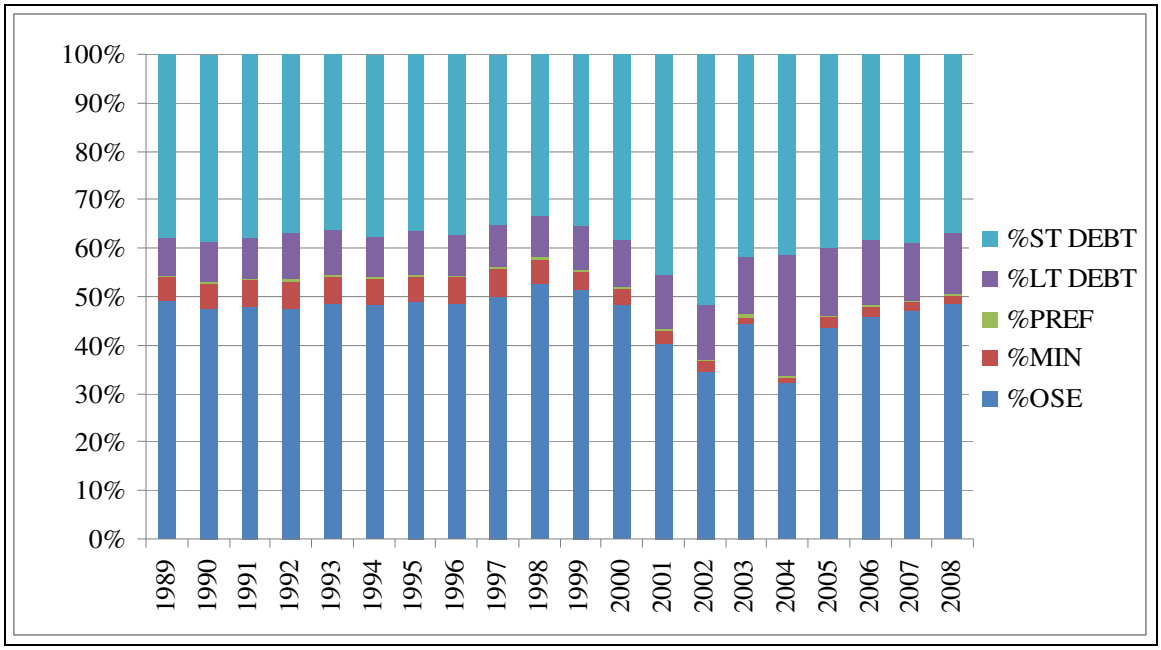

Figure 5.2: Mean capital structure components of the mean D/E ratio between 1989 and 2008

Figure 5.2 indicates that the % OSE and the % ST debt constituted the largest part of the capital structure. The % OSE varied between 34.60% and 52.93%, and the % ST debt varied between 33.46 and 54.24%. There is usually variation in a firm's capital structure and equity usage over time. The LT debt constituted between 7.63% and 32.64% of the D/E ratio.

The minority interest decreased since 1999, possibly due to the destructuration of the pyramid firm structure in the late 1990s. In a pyramid firm structure, a controlling-minority stakeholder holds a controlling stake in a holding firm. In turn, the holding firm holds a controlling stake in an operating firm (Bebchuk, Kraakman & Triantis 1999:4). In the 1990s, institutional investors forced firms to simplify their complex structures in order to become more transparent. This led to the destructuration of the pyramid firm structure (Gqwaru & Mohamed 2008:14).

5.2.2 The independent variables

The descriptive statistics (mean, median, standard deviation, minimum value, maximum value, skewness and kurtosis) for the independent variables are indicated in Table 5.2.

Table 5.2: Descriptive statistics for the independent variables

Independent variable	Mean	Median	Standard deviation	Minimum Value	Maximum value	Skewness	Kurtosis
ROA	0.205	0.192	0.671	- 16.418	32.542	25.974	1451.102
ROE	0.474	0.367	3.412	-31.042	164.062	36.990	1659.235
CPI rate	0.084	0.080	0.039	0.014	0.153	0.368	-0.574
GDP	0.027	0.031	0.021	-0.021	0.053	-0.874	0.189
Repo rate	0.133	0.129	0.036	0.071	0.185	-0.247	-1.046
R/S exchange rate	5.516	5.823	2.301	2.588	10.517	0.366	-0.673
Tax rate	0.353	0.325	0.077	0.280	0.500	1.104	-0.240

The mean and the median values of the profitability ratios ROA and ROE differed considerably. The reason for the variation is that the profitability ratios were calculated for many firms with significantly varying profits. However, the mean and median values of most of the independent variables were closer to each other than the dependent variables' values. The economic variables were calculated on a yearly basis and there was less variation in the results of these variables compared to the results of the firm-specific variables. As mentioned earlier, the median values are considered in the remainder of this study, to exclude possible distortion of the results due to outlier values.

The minimum value of ROA was -16.418 and the maximum value was 32.542, while the minimum value of ROE was -31.042 and the maximum value, 164.062. There was thus high variance between the ranges of the profitability ratios. The CPI ranged between 1.40% and 15.30%, reflecting the variations in inflation levels during the period under review. The GDP ranged between negative growth rate of -2.10% and positive growth rate of 5.30%. The repo rate varied between 7.10% and 18.50%. The large variation in both the inflation and the interest rate levels was expected, since these variables tend to move in the same direction. The R/$ exchange rate ranged from 2.59 R/$ to 10.52 R/$. The minimum value of the tax rate was 28% and the maximum value, 50%, reflecting the long term decrease in taxation rates. Overall, there was thus high variance between the independent variables' minimum and maximum values.

The profitability ratios ROA and ROE were positively skewed with high, positive kurtosis values (ROA 1451.102; ROE 1659.235), indicating a leptokurtic distribution. The CPI, R/$ exchange rate and the tax rate were positively skewed, with negative kurtosis values (CPI -0.574; R/$ exchange rate -0.673; tax rate -0.240), thus indicating platykurtic distributions. The repo rate was negatively skewed with a platykurtic kurtosis distribution (kurtosis value of -1.046), while the GDP was negatively skewed with a leptokurtic kurtosis distribution (kurtosis value of 0.189). The profitability ratios and the economic variables thus deviated from the normal distribution. The skewness results corresponded with Von Hippel's (2005) notion that the “median-mean rule of thumb” is not always applicable. The repo rate was negatively skewed, while the mean was larger than the median. In contrast, the R/$ exchange rate was positively skewed, but the mean was smaller than the median. According to the skewness rule of thumb, the opposite relations should occur where the median should have the smaller value if the distribution is positively skewed and vice versa.

Panel data was used to calculate various firm specific ratios, which are compared amongst firms during the 20-year study period. However, economic data cannot be classified as panel data, since different years of study are considered for a specific variable at a time. Economic variables were calculated on a monthly basis. These changes were then averaged for a 12-month period, to consider the changes over time. The average values of the independent economic variables over the 20-year study period are indicated in Table 5.3.

Table 5.3: The average CPI, GDP, repo rate, tax rate and R/$ exchange rates for the period 1989 to 2008

Year	CPI	GDP	Repo	Tax rate	R/$ Exchange rate
1989	0.147	0.024	0.168	0.500	2.622
1990	0.143	-0.003	0.180	0.500	2.588
1991	0.153	-0.010	0.173	0.480	2.761
1992	0.140	-0.021	0.159	0.480	2.852
1993	0.097	0.013	0.132	0.400	3.267
1994	0.089	0.032	0.126	0.350	3.550
1995	0.087	0.031	0.149	0.350	3.627
1996	0.073	0.043	0.164	0.350	4.296
1997	0.086	0.027	0.171	0.350	4.607
1998	0.069	0.005	0.185	0.350	5.532
1999	0.053	0.024	0.148	0.300	6.113
2000	0.053	0.042	0.118	0.300	6.935
2001	0.057	0.027	0.109	0.300	8.603
2002	0.091	0.037	0.123	0.300	10.517
2003	0.060	0.031	0.115	0.300	7.565
2004	0.014	0.049	0.078	0.300	6.450
2005	0.034	0.050	0.071	0.290	6.362
2006	0.046	0.053	0.077	0.290	6.767
2007	0.071	0.051	0.097	0.290	7.054
2008	0.115	0.031	0.116	0.280	8.252

In order to investigate the changes in the economic variables over time, individual graphs, representing their values over time are provided in Figures 5.3 to 5.7.

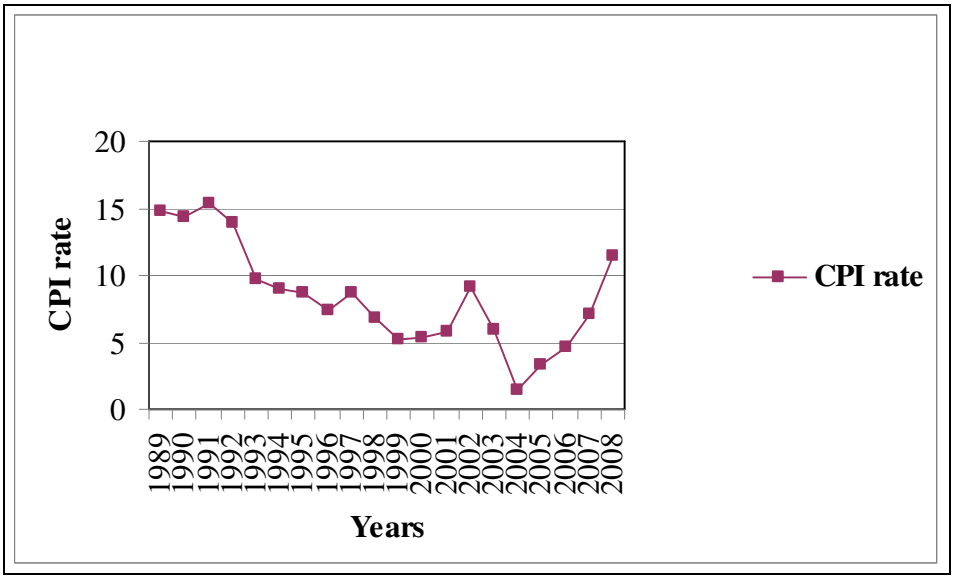

Figure 5.3: Annualised CPI rate (%) for the period 1989 to 2008

The CPI rate varied between a maximum value of 15.30% in 1991 and a minimum value of 1.39% in 2004. Between 1991 and 1999, there was a downward trend in the CPI rate. In 2002, there was a rapid inflation rate increase to 9.14%. It was followed by the lowest CPI value (1.39%) in 2004. The CPI rate thus decreased by 7.75 percentage points within two years. Between 2005 and 2008, there was an upward trend in the CPI rate. The 2008 CPI rate (11.52%) is almost double the SARB's inflation target rate of 3 to 6%.

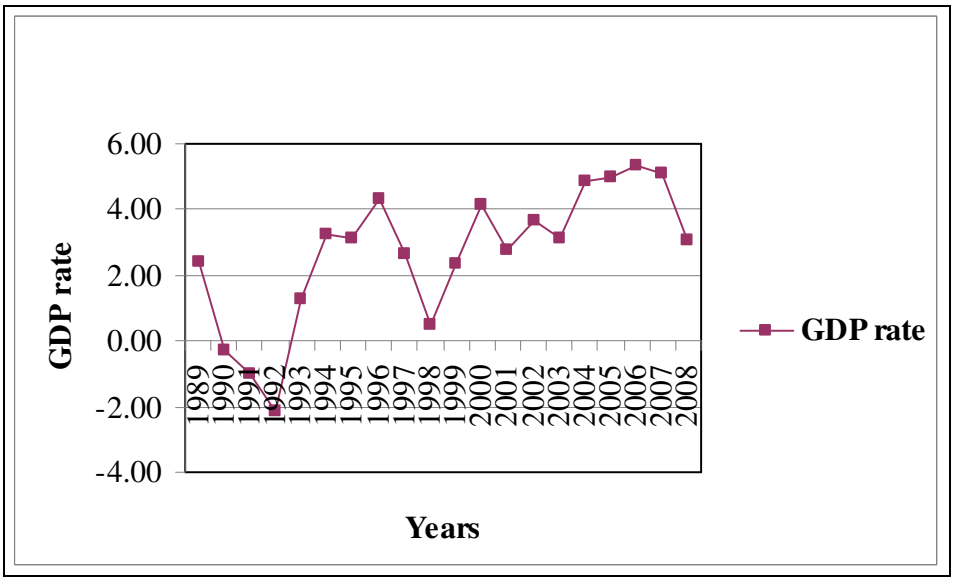

Figure 5.4: Annualised GDP rate (%) for the period 1989 to 2008

The GDP rates fluctuated between a minimum value of -2.14% in 1992 and a maximum value of 5.32% in 2006. South Africa experienced negative growth between 1990 and 1992, two years prior to the economic and political changes that occurred in 1994 with the first democratic election. The GDP rate was characterised by a period of growth, followed by a downturn in growth. The growth rate decreased by 2.25 percentage points between 2006 and 2008, indicating the volatile nature of economic growth. In 2008, the GDP rate was 3.10%.

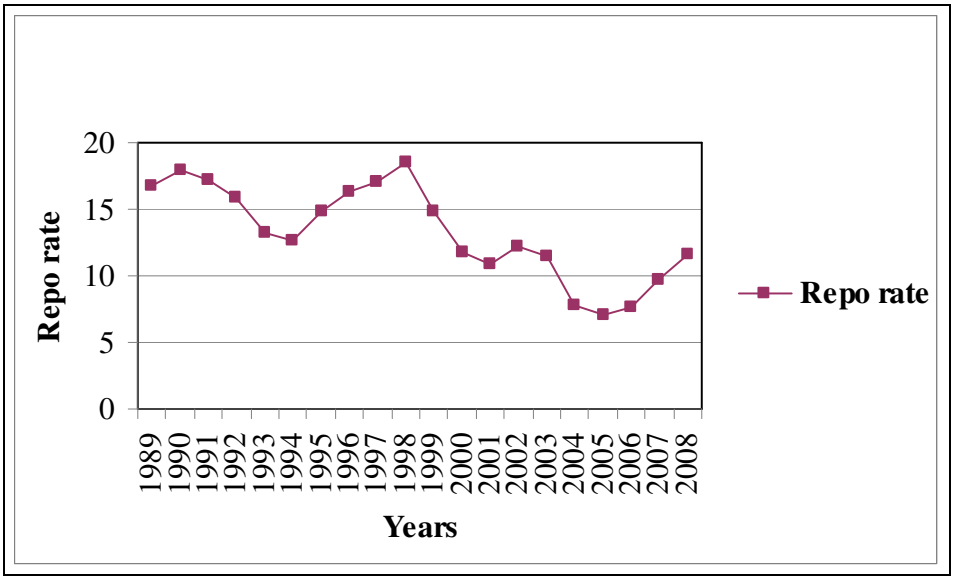

Figure 5.5: Annualised repo rate (%) for the period 1989 to 2008

The repo rate varied between a maximum value of 18.50% in 1998 and a minimum value of 7.13% in 2005. The repo rate was relatively volatile, demonstrating periods of decline followed by a sudden increase. Between 1990 and 1994, there was a decrease in the repo rate, followed by an increase between 1995 and 1998. The interest rate peak in 1998 was followed by a period of decline until 2005, with a subtle increase in 2002. Between 2006 and 2008, the repo rate increased by 3.6%, closing on 11.60% in 2008.

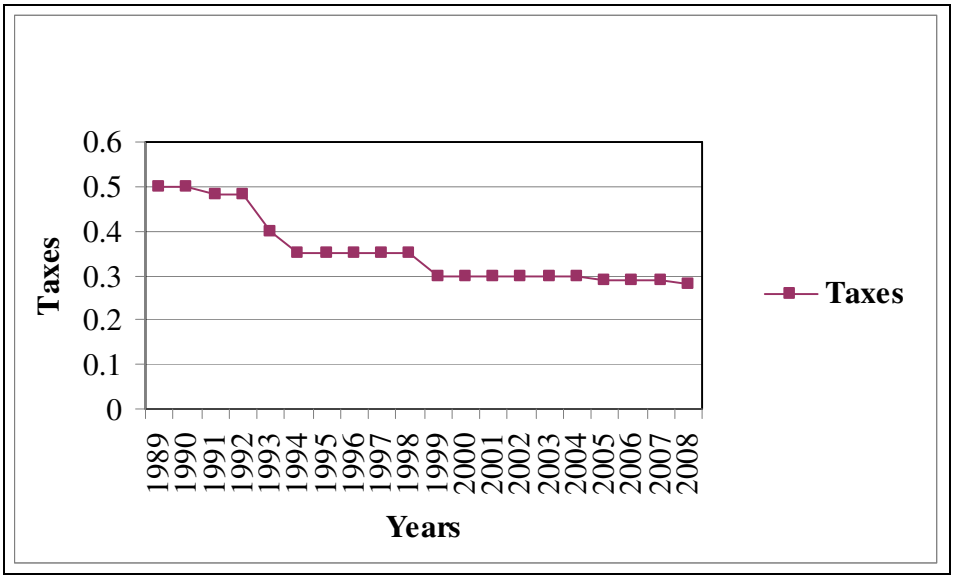

Figure 5.6: Annualised tax rate (%) for the period 1989 to 2008

The tax rate fluctuated between a minimum value of 28% in 2008 and a maximum value of 50% in 1989 to 1990. The tax rate indicated a downward trend between 1989 and 2008. No increases occurred during the period.

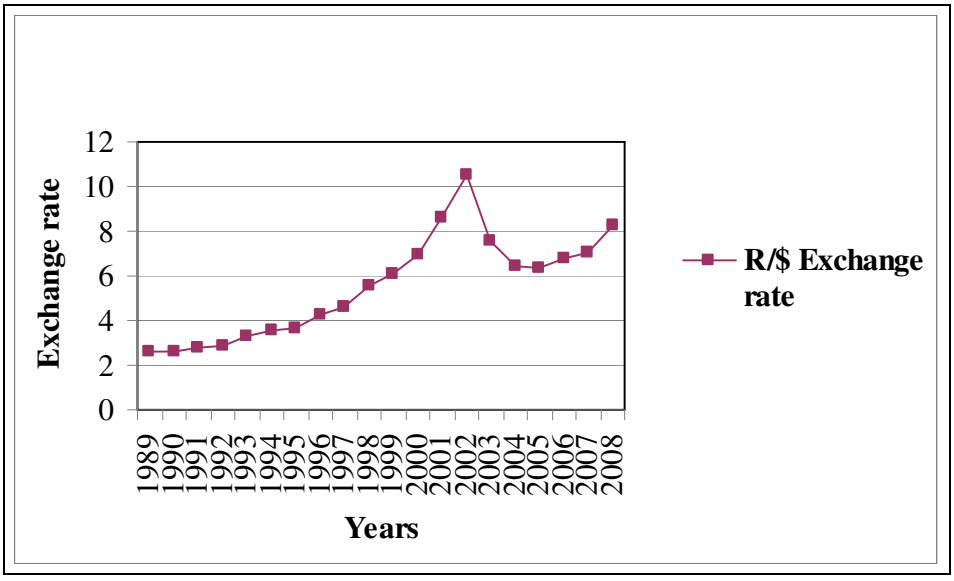

Figure 5.7: Annualised R/$ exchange rate for the period 1989 to 2008

The R/$ exchange rate varied between a minimum value of R2.588 per dollar in 1990 and a maximum value of R10.52 per dollar in 2002. Between 1989 and 2002, the rand depreciated, reaching a peak of R10.53 per dollar in 2002. The exchange rate appreciated between 2003 and 2005, followed by a depreciation between 2006 and 2008, ending on R8.25/$.

Based on the figures provided above, it was evident that both the dependent and independent variables varied over the period under investigation. In an attempt to explain the variation, the relationship between the economic variables and capital structure should be examined. In Sections 5.4 and 5.5, correlation and regression analyses will be conducted in an attempt to determine the relationship between the variables.

5.3 The Kolmogorov-Smirnov test

The Kolmogorov-Smirnov test is often used to demonstrate that a sample is derived from a specific type of distribution (Sheskin 2004:203). The test can thus be used to determine whether this study's data set has a normal distribution. The Kolmogorov-Smirnov test entails the statement of a null hypothesis of no difference between the observed distribution of survey scores and a normally distributed empirical sample. The d-statistic, which compares the sample cumulative distribution function (CDF) with the theoretical CDF, is used to determine the p-value. If the critical α-value is larger than the obtained p-value, the null hypothesis is rejected. This then indicates that the data set deviates from the normal distribution (Corder & Foreman 2009:32; Massey 1951:68). For this study, an α-level of 0.05 was used. The results of the Kolmogorov-Smirnov test are indicated in Table 5.4.

Table 5.4: Results of the Kolmogorov-Smirnov test

	D	**P**
D/E	0.428	$p<0.01$
ROA	0.344	$p<0.01$
ROE	0.398	$p<0.01$

From Table 5.4, it can be seen that the determined p-values of the D/E and the profitability ratios were less than 0.01. The critical α-value (0.05) was thus higher than the determined p-values ($p<0.01$). Therefore, the null hypothesis of a normally distributed sample was rejected, indicating that the firm-specific data deviates from the normal distribution. This result was consistent with the skewness and kurtosis results, which indicated positively skewed, leptokurtic distributions for both D/E and the profitability ratios.

5.4 Correlation analyses

A correlation describes the relationship between two variables. The two main types of correlation analyses are the Pearson and Spearman correlations. The Pearson correlation is used with continuous data (where the data values may take on any value within an interval) and relies on strong assumptions. In contrast, the Spearman correlation is used with categorical data to determine the degree of association between two sets of ranks. It relies on little or no assumptions (Coldwell & Herbst 2004:93).

In this study, the Spearman correlation was used. The reason for using the Spearman correlation is that economic and financial data are only indicated for a relatively short study period of 20 years. This study period would possibly not meet the criteria of the Pearson correlation's assumptions, where a longer study period is often required. Economic data also generally contains outlier values and the Spearman correlation is less sensitive for the outlier-effect than the Pearson correlation. A two-tailed correlation test was used, since the hypotheses did not specify the direction of the correlation. The median D/E values were used.

The correlation coefficient (r_s) is used to determine the strength of the relationship between two variables. The larger the value of r, the stronger is the relationship between the variables. If r is +1, it indicates a perfect positive correlation, and if it is -1, a perfect negative correlation is indicated. The r-value thus ranges between -1 and +1 (Levine et al. 2001:138).

When a hypothesis is tested, the possibility is that the null hypothesis will be rejected when in fact it is true. The level of significance (α) is defined as the probability of rejecting the null hypothesis when the latter is actually true. In this study, α values of 0.01, 0.05 and 0.1 were indicated. The commonly used α is 0.05. The significance level thus indicates the probability that the correlation is a chance occurrence of not more than α out of 100% (Levine & Stephan 2005:129; Salkind 2004).

Spearman correlation analyses were conducted between the dependent and independent variables in order to determine the relation between these variables. The results of the correlation analyses are indicated in Table 5.5.

Table 5.5: Correlation analyses between the dependent variable and the independent economic variables

	Dependent variable	**Independent variables**				
	Median D/E	**CPI**	**GDP**	**Repo rate**	**R/$ exchange rate**	**Tax rate**
Median D/E	1.00					
CPI	0.04	1.00				
GDP	0.36	-0.65***	1.00			
Repo rate	-0.56***	0.65***	-0.76***	1.00		
R/$ exchange rate	0.48**	-0.58***	0.59***	-0.70***	1.00	
Tax rate	-0.46**	0.68***	-0.74***	0.83***	-0.87***	1.00

Note: *** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

Table 5.5 indicates that the median D/E has a significant positive correlation with the R/$ exchange rate (r_s = 0.48; p = 0.03). There was a significant, negative correlation between the repo rate and the median D/E (r_s = -0.56; p = 0.01) as well as between the tax rate and the median D/E (r_s = -0.46; p = 0.04). However, no correlation was found between the median D/E and CPI or GDP. A possible reason for the negative correlation found between the median D/E and the tax rate is the decrease in the tax rate during the period under investigation.

Concerning the independent variables, a significant positive correlation was found between CPI and the repo rate (r_s = 0.65; p = 0.00), CPI and the tax rate (r_s = 0.68; p = 0.00), the R/$ exchange rate and GDP (r_s = 0.59; p = 0.01) as well as the repo rate and the tax rate (r_s = 0.83; p = 0.00). Significant negative correlations were indicated between CPI and GDP (r_s = -0.65; p = 0.00), CPI and the R/$ exchange-rate (r_s = -0.58; p = 0.01), GDP and the repo rate (r_s = -0.76; p = 0.00), GDP and the tax rate (r_s = -0.74; p = 0.00), the repo rate and the R/$ exchange rate (r_s = -0.70; p = 0.00) as well as the tax rate and the R/$ exchange rate (r_s = -0.87; p = 0.00).

Logically, a firm is expected to use more debt financing during an inflationary period. The reasoning is that the cost of debt financing will decrease due to the Fisher effect, where inflation has a decreasing effect on the real cost of debt financing. On the

contrary, however, Hatzinikolaou et al. (2002:46–47) stated that the higher the inflation uncertainty, the lower firms' D/E ratios will be. The reasoning is that higher inflation tends to decrease the certainty of the firm's tax shield on debt financing and consequently the tax savings. However, in contrast to these notions, no correlation was found between CPI and the median D/E. The positive correlation between CPI and the repo rate supports Bodie et al.'s (2003:387) notion that the interest rate and inflation tend to move in the same direction.

The significant negative correlation between GDP and the tax rate is consistent with Easterly and Rebelo's (1993:1) statement that economic growth is lowered by the distorting effect of high taxes on income. If firms' savings decrease due to higher taxes on income, they have less retained earnings available for financing purposes. Such firms should then consider other financing sources, such as debt financing. The D/E ratio is then expected to increase.

According to Calvo et al. (1993:109), an exchange rate appreciation is expected to lead to an increase in the growth rate, mainly due to the expected inflow of foreign capital into the country as the profits will be more in the foreign currency. The positive correlation between GDP and the R/$ exchange rate supports this notion. According to Khabo and Harmse (2005:360), an exchange rate appreciation can lead to a decrease in the inflation rate, which may consequently result in an interest rate decrease. This notion is consistent with the negative correlation coefficients found between CPI and the R/$ exchange rate as well as between the repo rate and the R/$ exchange rate.

In order to investigate the secondary objectives, namely to determine the nature of the relationship among the variables in order to determine which capital structure model is followed by South African listed industrial firms and to determine the long term trend of the relationship, correlation analyses were also conducted between the median values of the profitability ratios and the economic variables. The results of the correlation analyses are indicated in Table 5.6.

Table 5.6: Correlation analyses between the profitability ratios and the economic variables

	Median ROA	Median ROE
CPI	-0.24	-0.19
GDP	0.37*	0.55***
Repo rate	-0.47**	-0.64***
R/$ exchange rate	0.33	0.32
Tax rate	-0.40*	-0.45**

Note: *** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

The correlation results in Table 5.6 indicated that ROA and ROE were both either positively or negatively correlated with the same economic variables. There was a significant, positive correlation between ROA and GDP (r_s = 0.37 p = 0.10) as well as between ROE and GDP (r_s = 0.55 p = 0.01). A significant negative correlation was found between the profitability ratios and the repo rate (ROA r_s = -0.47 p = 0.04; ROE r_s = -0.64 p = 0.00) and the tax rate (ROA r_s = -0.4 p = 0.08; ROE r_s = -0.45 p = 0.05). However, no statistically significant correlation was found between the profitability ratios and CPI or the R/$ exchange rate.

The positive correlation between the profitability ratios and GDP could be related with the expectancy that an increase in savings (due to an increase in profits) will lead to an increase in investments and consequently spur economic growth (Dornbusch & Reynoso 1989). If the repo rate increases, firms have to pay higher interest costs on their debt financing. Therefore, their profitability ratios often decrease. The negative correlation between ROA and the repo rate as well as between ROE and the repo rate is thus expected. There was also a negative correlation between the tax rate and ROA and the tax rate and ROE. Logically, a firm's profitability will decrease if the firm has to pay more taxes.

In Table 5.7, the results of the correlation analyses between the dependent variable D/E and the independent variables ROA and ROE are indicated. In order to determine the

combined effect of the profitability ratios, ROE was subtracted from ROA. The correlation of ROA-ROE with D/E is also provided.

Table 5.7: Correlations coefficients between D/E, ROA, ROE and the combined ROA-ROE

Variable 1	Variable 2	Correlation coefficient
ROA	D/E	0.07***
ROE	D/E	0.46***
ROA-ROE	D/E	-0.63***
ROA	ROE	0.82***

Note: *** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

Perusal of Table 5.7 indicates that D/E exhibited a highly significant, positive correlation with both ROA (r_s = 0.07 p = 0.00) and ROE (r_s = 0.46 p = 0.00). As expected, there was also a significant, positive correlation between the profitability ratios ROA and ROE (r_s = 0.82 p = 0.00). However, the correlation coefficient of ROE and D/E is much higher than the correlation coefficient of ROA and D/E. When ROA-ROE is correlated with D/E, a significant negative relationship is found (r_s = -0.63 p = 0.00). These results could possibly be explained by considering the two major capital structure theories described in Chapter 2. According to the trade-off theory, D/E will be positively correlated with profitability. In contrast, the pecking order theory states that D/E and profitability are negatively related.

The distribution of the correlations between the profitability ratios (ROA and ROE) and D/E differed considerably amongst the 320 firms included in the final sample. The correlation distributions between these variables could possibly have influenced the significance of the correlation results. Therefore, the correlation distribution between ROA and D/E as well as between ROE and D/E are indicated in Figures 5.8 and 5.9.

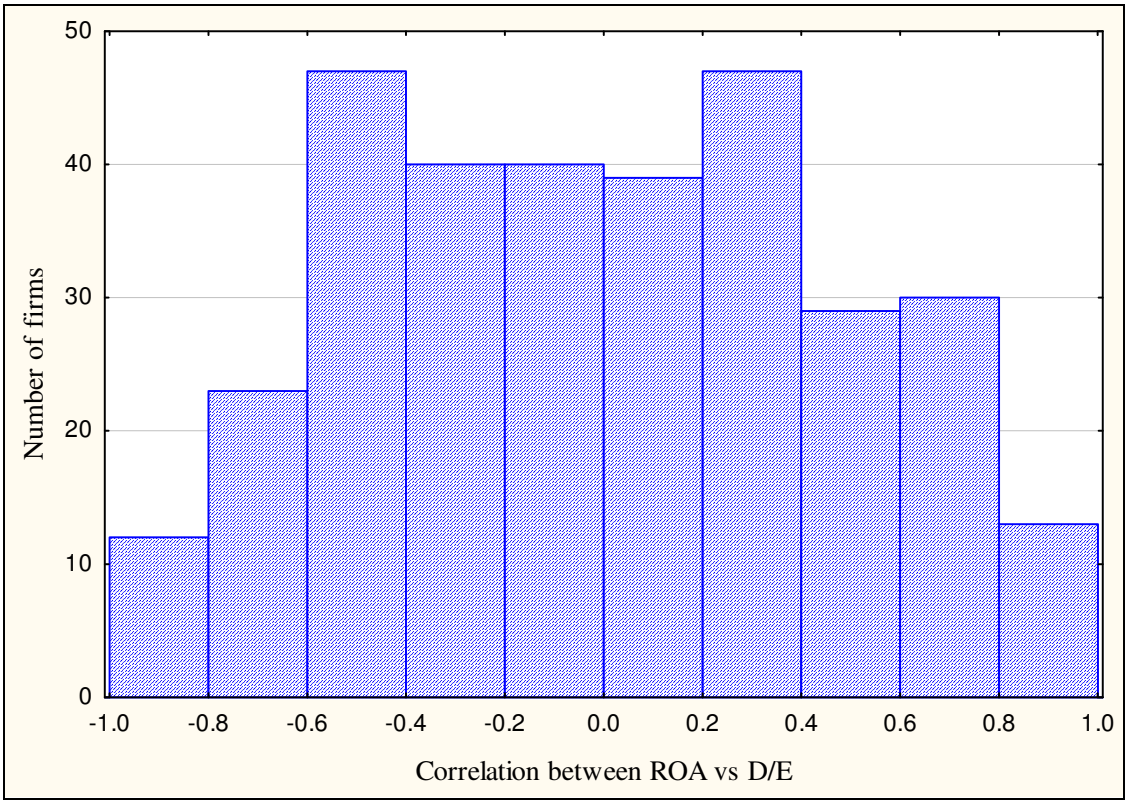

Figure 5.8: The correlation distribution between ROA and D/E

Figure 5.8 indicates that the correlation distribution between ROA and D/E reached a positive and a negative peak. The negative peak could relate to the pecking order model, which indicates a negative relationship between profitability and leverage (Tong & Green 2005:2182). However, the positive peak had a stronger influence, confirming the positive correlation between these variables. This could support the trade-off capital structure theory, which states that there is a positive relationship between profitability and leverage (Tong & Green 2005:2182). The combined effect of the negative and positive peaks resulted in the lower, positive correlation coefficient of 0.07 found between ROA and D/E.

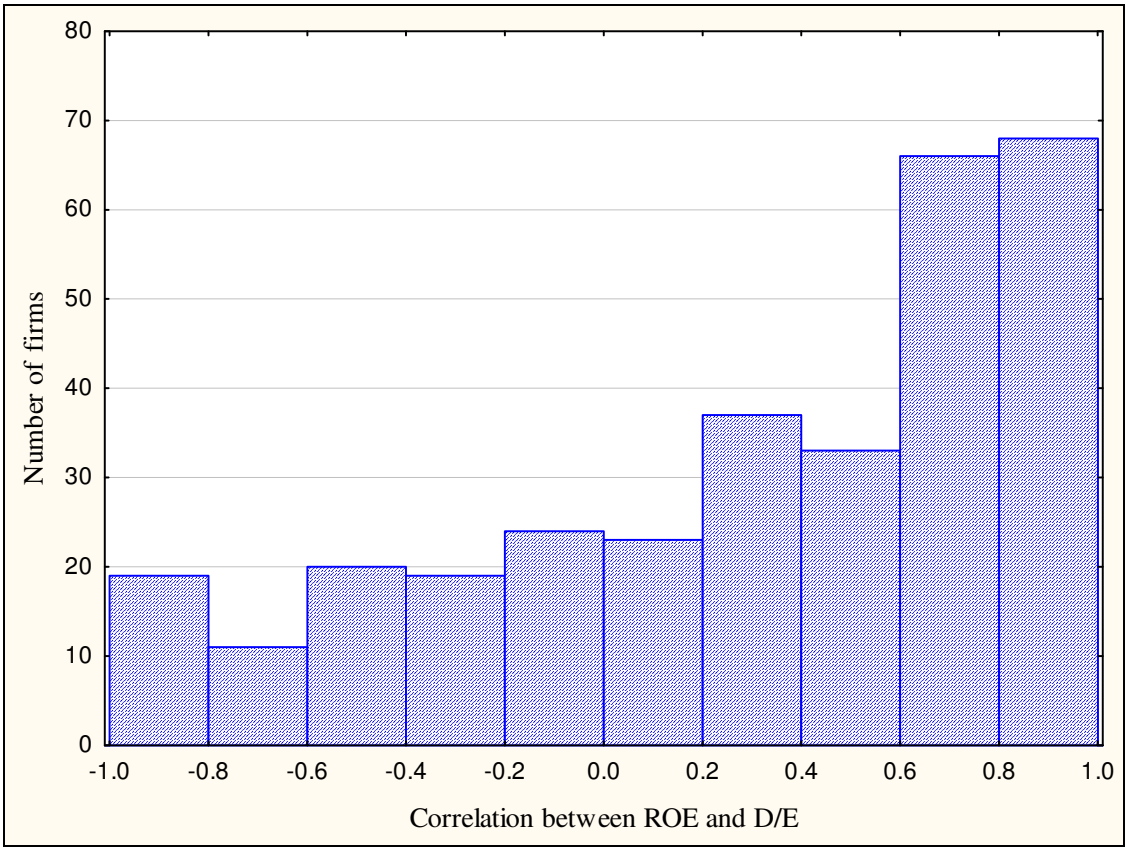

Figure 5.9: The correlation distribution between ROE and D/E

In Figure 5.9, it can be seen that the correlations between ROE and D/E had a positive peak, confirming the large, significantly positive correlation coefficient of 0.46 found between ROE and D/E. This could support the trade-off capital structure model, which indicates a positive relationship between leverage and profitability. However, it has a stronger positive peak than the ROA and D/E correlation distribution, resulting in the larger positive correlation between ROE and D/E.

Significant correlations were indicated between some of the variables included in the study. However, correlation analysis cannot be used to establish causation. In the following section, regression analyses were therefore used to determine how the variation in an outcome (dependent variable) depends on the variation in a predictor (independent variables).

5.5 Regression analysis

Regression analysis is a stronger test to measure the relationship between variables than correlation analysis. It indicates how the value of the dependent variable changes when one of the independent variables changes and the other independent variables are held fixed. Simple or multiple regressions can be conducted. In a simple regression analysis, an estimation equation is developed that relates an independent variable to a dependent variable. Multiple regression analysis is an extension of the simple regression method. It involves the estimation of the dependent variable by more than one independent variable. This is done in an attempt to increase the accurateness of the estimation (Coldwell & Herbst 2004:106–107; 109).

In this study, multiple regression analysis was conducted to examine the relationship between the dependent variable (D/E) and the independent variables (ROA, ROE, ROA-ROE, GDP, CPI, the repo rate, the R/$ exchange rate and the tax rate). One-period lags were also built into the model to accommodate for the effect of the economic changes that often only occur after a period of time. Lags result from the joint effects of firms' accounting processes (such as historical costs) and the economic environment. Unexpected economic gains or losses are often recognised in book value over time, rather than immediately, since they affect the firm's book values through the accounting process. Changes are not immediately recorded, but can often only be examined when the financial statements are published (Beaver and Ryan 2000:128).

The regression model was based on a model used by Fan et al. (2008), who included both economic and firm-specific variables in their model. A TSCSREG (time-series cross-section regression) procedure was used. This procedure deals with panel data sets consisting of time-series observations on each of several cross-sectional units (Allen 1999). Since the current study's data set consisted of economical and firm-specific data over a time-series, the TSCSREG procedure was an appropriate regression method to test for relations between the variables.

5.5.1 Regression analyses conducted on all the variables (with and without outliers)

Regression analyses were conducted on the sample, with and without outlier values. Table 5.8 indicates the results of the regression analysis conducted on all the variables

for the complete sample. In Table 5.9, the results of the same regression analysis as conducted in Table 5.8 without outlier values are provided.

Table 5.8: Regression analysis on all the variables (including outlier values)

Variable	Estimate	Pr > |t|
Intercept	-42.914	0.558
D/E_1	-0.040**	0.015
CPI	95.672	0.566
CPI_1	-8.361	0.945
R/$ exchange rate	-4.320	0.160
R/$ exchange rate_1	6.550***	<0.001
GDP	157.922	0.650
GDP_1	39.046	0.804
Repo rate	42.243	0.796
Repo rate_1	49.544	0.673
ROA	-4.285***	<0.010
ROA_1	0.110	0.843
ROE	1.218***	<0.001
ROE_1	-0.218**	0.020
Tax rate	-14.711	0.923
Tax rate_1	42.383	0.681

Notes: R-Square 0.070

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

_ 1 indicates a lagged variable

R^2 is the coefficient of determination. It equals the regression sum of squares (explained variation) divided by the total sum of squares (total variation). It thus measures the proportion of variation in the dependent variable that is explained by the independent variable (Levine et al. 2001:525). A relatively low R^2 value of 0.070 was obtained from the regression of all the variables.

Perusal of Table 5.8 indicates that the regression coefficients of the lagged D/E, the lagged R/$ exchange rate, ROA, ROE and the lagged ROE were all statistically significant at the 0.1 level or better. However, the coefficients of the other components were not statistically significant.

The regression results correspond with the significant correlation coefficients found between D/E and the R/$ exchange rate, D/E and ROA and D/E and ROE. However, significant correlation coefficients were also indicated between D/E and the repo rate, as well as between D/E and the tax rate, while the regression results did not indicate significant relationships between these variables.

Another regression analysis was conducted, with the exclusion of outlier values, in order to determine whether the outlier values possibly distorted the regression results indicated in Table 5.8. Table 5.9 indicates the results of the regression analysis conducted on all the variables with the exclusion of outlier values. The outlier values consisted of 29 firms with 571 observations out of the final sample of 320 firms with 4 172 observations.

Table 5.9: Regression analysis on all the variables (excluding outlier values)

Variable	Estimate	Pr > |t|
Intercept	0.626***	<0.001
D/E_1	0.541***	<0.001
CPI	0.400	0.385
CPI_1	0.521	0.421
R/$ exchange rate	0.009	0.309
R/$ Exchange rate_1	-0.007	0.475
GDP	-1.052	0.165
GDP_1	1.104	0.204
Repo rate	-1.568***	0.007
Repo rate_1	0.946*	0.096
ROA	-6.377***	<0.001
ROA_1	2.844***	<0.001
ROE	3.144***	<0.001
ROE_1	-1.512***	<.001
Tax rate	0.158	0.693
Tax rate_1	-0.279	0.552

Note: R-Square 0.588

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

_ 1 indicates a lagged variable

The results of the regression analysis conducted on all the variables, excluding outliers, indicated stronger results. The R^2 increased to 0.588. Perusal of Table 5.9 indicates that the intercept, the lagged D/E, repo rate, lagged repo rate, ROA, lagged ROA, ROE and lagged ROE were all statistically significant at the 0.1 level or better. The coefficients of the other components, however, were not statistically significant.

These regression results correspond with the significant correlation coefficients found between D/E and the repo rate, as well as between D/E and the profitability ratios ROA and ROE. The negative regression coefficients of the ROA and lagged ROE support the notion of Titman and Wessels (1988:6) and Baskin (1989:33) that firms with higher past profitability have a tendency towards lower debt ratios. A change in profitability can thus affect a firm's future capital structure, as indicated by the significant lagged profitability results in Table 5.9.

The results of the regression analysis conducted on all the variables including outlier values (Table 5.8) differed from the regression analysis when outlier values were excluded (Table 5.9). The lagged D/E ratio was significant for both regressions; however, the regression coefficients were negative when all variables were included and positive when outlier values were excluded from the sample. A possible explanation is that outlier firms could distort the D/E ratio. Some of the outlier firms had negative D/E ratios due to share buybacks. It could lead to the negative D/E regression coefficient after a lagged time period, as indicated in Table 5.8. However, when the outlier values were excluded, the lagged D/E regression coefficient was positive, possibly due to the exclusion of firms with negative D/E ratios.

The lagged R/S exchange rate had a significant, positive regression coefficient when the outlier values were included in Table 5.8. A possible explanation is that over the short term, firms are expected to use less foreign debt capital when the rand depreciates, due to a capital fleet. However, over the long term, currency depreciation can be accompanied by a systematic increase in the foreign direct investment (FDI) in a country, since it gives investors a long-term edge in obtaining control of a firm's productive assets (Froot & Stein 1991:1215). More foreign capital is therefore available for financing purposes. However, when outlier values were excluded, the correlation coefficient of the R/$ exchange rate became insignificant.

The regression coefficients of the repo rate and lagged repo rate in Table 5.8 were not significant when all variables were included. When the outlier values were excluded, however, the regression coefficient of the repo rate was negatively significant, while the regression coefficient of the lagged repo rate was positively significant. A possible explanation is that the negative D/E ratios due to share buybacks distorted the regression results indicated in Table 5.8. When the outlier values (including the firms with negative D/E ratios) were excluded, the regression coefficient of the repo rate (indicated in Table 5.9) revealed a statistically significant, negative relationship between the repo rate and the D/E ratio. An increase in the repo rate will thus possibly lead to a decrease in a firm's debt usage. Logically, firms will use less debt financing if the interest payable on debt financing increases. However, the lagged results indicated a significantly positive relationship between D/E and the repo rate. Over the long term, firms are thus expected to use more debt capital, consistent with relatively moderate long-term interest rates.

The regression coefficient of the lagged ROA was not significant when the outlier values were included in the regression analysis. However, when the regression analysis was conducted on the sample excluding outlier values, the regression coefficient of lagged ROA became positively significant. This possibly indicates that firms' profitability have a positive, increasing effect on their leverage over the long term, as indicated by the trade-off capital structure model. However, the regression coefficient of the lagged ROE was significantly negative with and without outlier values, indicating a negative relationship between debt usage and profitability over the long term, thus supporting the pecking order model. Support was thus founded for both the trade-off and pecking order capital structure models.

In the following section, the relationship between the generally used profitability ratio ROA and the other variables is examined, with the exclusion of ROE and including ROA-ROE to determine a possible inter-relationship between these variables.

5.5.2 Regression analyses conducted on all the variables without ROE and including ROA-ROE

The profitability ratio ROA is generally used in capital structure studies. In order to determine the effect of this ratio on the other variables, a regression analysis was

conducted on all the variables without outlier values, excluding the profitability ratio ROE. The results of this analysis are indicated in Table 5.10.

Table 5.10: Regression analysis on all the variables without ROE and outlier values

Variable	Estimate	Pr > |t|
Intercept	0.082	0.938
D/E_1	0.569***	<0.001
CPI	2.787	0.246
CPI_1	-0.266	0.900
R/$ exchange rate	0.007	0.879
R/$ exchange rate_1	0.006	0.833
GDP	2.116	0.667
GDP_1	2.889	0.261
Repo rate	-5.346**	0.016
Repo rate_1	5.352***	<0.001
ROA	-0.369***	0.003
ROA_1	-0.060	0.630
Tax rate	-0.611	0.778
Tax rate_1	0.771	0.625

Note: R-Square 0.318

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

-1 indicates a lagged variable

Table 5.10 indicates that the results of the regression analysis conducted on all the variables, excluding ROE and outlier values, corresponds with the significant regression results indicated in Table 5.9, including all the variables without outlier values. However, the R^2 decreased to 0.318. The lagged D/E, repo rate, lagged repo rate and ROA were all statistically significant at the 0.1 level or better. However, the coefficients of the other components were not statistically significant.

The negative regression coefficient between the repo rate and D/E supports the notion that a firm will use more debt financing if the cost of debt financing decreases. The positive coefficient of the lagged repo rate can possibly indicate that the effect of long-term interest rates on firms' capital structures is only evident after a period of time.

Firms then probably use more long-term debt financing consistent with moderate long-term interest rates.

The negative regression coefficient of ROA is consistent with the pecking order capital structure model that indicates a negative relationship between capital structure and profitability. The regression coefficient of the lagged ROA was positive and significant when ROE was included in the regression analysis. However, when ROE was excluded, the lagged ROA became negative and insignificant. This possibly indicates that there is an inter-relationship between ROA and ROE that could impact on firms' debt usage. In order to determine the possible effect of an inter-relationship between ROA and ROE on firms' D/E ratios, ROE was subtracted from ROA. The results of the regression analyses on all the variables, including ROA-ROE and excluding outlier values are indicated in Table 5.11.

Table 5.11: Regression analyses with the inclusion of ROA-ROE (without outliers)

Variable	Estimate	Pr > |t|
Intercept	0.779***	<0.001
D/E_1	0.445***	<0.001
CPI	0.357	0.500
CPI_1	0.979	0.188
R/$ exchange rate	0.020*	0.058
R/$ exchange rate_1	-0.032***	0.002
GDP	-1.591*	0.068
GDP_1	0.119	0.905
Repo rate	-1.870***	0.005
Repo rate_1	1.090*	0.095
Tax rate	-0.321	0.484
Tax rate_1	-0.705	0.191
ROA_ROE	-1.603***	<0.001

Note: R-Square 0.448

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

-1 indicates a lagged variable

Table 5.11 indicates the results of the regression analysis with the inclusion of the inter-relationship between ROA and ROE. The R^2 increased to 0.448. Significantly stronger results were indicated, compared to the regression results provided in Tables 5.10 and 5.9. The regression coefficients of the intercept, lagged D/E, R/$ exchange rate, lagged R/$ exchange rate, GDP, repo rate, lagged repo rate and ROA-ROE were all statistically significant at the 0.1 level or better. However, the coefficients of the other components were not statistically significant.

These results correspond with the results of the prior correlation analyses, which indicated a significant relationship between D/E and the repo rate, D/E and the R/$ exchange rate and D/E and ROA-ROE. However, while the correlation analysis indicated no significant relationship between D/E and GDP, Table 5.11 indicates that GDP has a significant negative regression coefficient. A possible explanation is the notion of Borensztein et al. (1998) that FDI contributes to growth in a larger measure than domestic investment. If the growth rate thus decreases due to a lack of FDI, firms do not necessarily have to use less debt financing. They can replace foreign debt financing by domestic financing. Smart et al. (2004) stated that South African firms have higher debt ratios on average, compared to other developing countries. However, South Africa still receives low levels of foreign capital in the form of direct investments, compared to other developing countries (Thomas et al. 2005). During periods of a decrease in economic growth, South African firms can thus have high D/E ratios, consisting mostly of domestic debt and equity financing.

In contrast with the negative correlation found between D/E and the tax rate, the regression results did not indicate a significant relationship between these variables. A possible explanation is that firms' optimum D/E ratios, which result from the trade-off between the tax deductibility of interest payments on debt financing and the bankruptcy possibility (De Miguel & Pindado 2001:77–78), is influenced by the combined effect of ROA and ROE. The ROA-ROE inter-relationship can possibly decrease the tax-effect of the trade-off theory, leading to the insignificant relationship between the tax rate and D/E.

5.5.3 Regression analyses conducted on all the listed and delisted firms before and after 1994

South Africa experienced pronounced economic and political changes during the 1994 democratic election and the years to follow. The data set was therefore divided into two periods: before and after 1994. This was done in an attempt to determine the effect of the profound economic changes on South African firms during the periods 1989 to 1994 and 1995 to 2008. In addition, the data set was divided into listed and delisted firms before and after 1994. This was done in an attempt to determine the effect of economic changes during 1994 and the years to follow on both financially successful firms and failure firms that delisted during that period. The results of the regression analyses on all the listed and delisted firms before and after 1994, excluding outlier values are indicated in Table 5.12.

Table 5.12: Regression analyses on all the listed and delisted firms before and after 1994 (excluding outlier values)

	Panel A		**Panel B**		**Panel C**		**Panel D**	
	Listed firms before 1994[a]		**Listed firms after 1994[b]**		**Delisted firms before 1994[c]**		**Delisted firms after 1994[d]**	
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	-36.402	1.000	-0.713	0.541	29.658	0.998	0.321	0.915
D/E_1	0.499***	<0.001	0.534***	<0.001	0.494***	<0.001	0.381***	<0.001
CPI	-148.280	0.999	1.057	0.633	13.331	1.000	2.939	0.580
CPI_1	-4.646	0.629	-3.004	0.116	-18.560	1.000	-3.377	0.549
R/$ exchange rate	9.299	1.000	-0.021	0.525	-1.420	1.000	-0.061	0.475
R/$ exchange rate_1	-1.513	0.322	0.063**	0.017	-3.464	1.000	0.075	0.303
GDP	-134.114	1.000	1.764	0.685	-17.485	1.000	-2.448	0.817
GDP_1	-16.648**	0.037	5.491*	0.060	1.693	1.000	-10.304*	0.100
Repo rate	295.283	0.999	0.738	0.821	-44.301	1.000	-5.007	0.507
Repo rate_1	-6.488	0.760	2.450*	0.087	-43.605	1.000	0.380	0.892
ROA	-7.221***	<0.001	-7.046***	<0.001	-6.818***	<0.001	-5.402***	<0.001
ROA_1	3.348***	<0.001	3.192***	<0.001	2.229***	<0.001	1.612***	<0.001
ROE	3.404***	<0.001	3.556***	<0.001	2.880***	<0.001	2.887***	<0.001
ROE_1	-1.451***	<0.001	-1.702***	<0.001	-1.163***	<0.001	-0.985***	<0.001
Tax rate	-26.548	1.000	-1.377	0.663	0	.	7.293	0.415
Tax rate_1	0	.	2.982*	0.065	0	.	-2.994	0.334

Note: a R-Square 0.549
b R-Square 0.659
c R-Square 0.520
d R-Square 0.468
*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level
-1 indicates a lagged variable

The listed firms after 1994 has the highest R^2 (0.659), followed by the R^2 (0.549) of the listed firms before 1994 and the R^2 (0.520) of the delisted firms before 1994. The delisted firms after 1994 has the lowest R^2 (0.468).

Perusal of Panel A in Table 5.12 indicates that the regression coefficients of the lagged D/E, lagged GDP, ROA, lagged ROA, ROE and the lagged ROE of all the listed firms before 1994 were statistically significant at the 0.1 level or better. Panel B of Table 5.12 indicates that the regression coefficients of the lagged D/E, lagged R/$ exchange rate, lagged GDP, lagged repo rate, lagged tax rate as well as the ROA, lagged ROA, ROE and the lagged ROE of all the listed firms after 1994 were significant at the 0.1 level or better. Once again, a possible explanation for the significant regression results of the lagged economic variables is that the effects of changes in economic variables often do not occur immediately, but only after a period of time.

Although some of the results in Panels A and B in Table 5.12 were similar, important differences occurred. The regression coefficient of the lagged R/$ exchange rate was not significant in Panel A. However, Panel B indicated a significant positive regression coefficient for the lagged R/$ exchange rate. A possible explanation is that after 1994, there was an inflow of foreign capital into the country. An exchange rate appreciation is often accompanied by a capital inflow into the country (Calvo et al. 1993:109). Over the long term, more foreign capital is then available for financing purposes, possibly leading to an increase in firms' D/E ratios. The exchange rate also varied during the period under investigation, which could possibly have influenced the significance of the results.

Panel A in Table 5.12 indicates that the lagged GDP was significantly negative for listed firms before 1994. A probable reason is the negative growth that South Africa had experienced between 1990 and 1992. The lagged effect of the negative economic growth could have had an increasing effect on listed firms' D/E ratios before 1994.

However, Panel B in Table 5.12 indicates that after 1994, the lagged GDP rate was positive and significant for all listed firms. The lagged effect of the positive growth rate after 1994 could possibly have had a positive effect on listed firms' long-term D/E ratios.

Borensztein et al. (1998) stated that FDI contributes to economic growth by expanding a developing country's (such as South Africa) capital accumulation and by increasing the efficiency of the country's technological and human capital development. Therefore, another possible explanation for the positive effect of the lagged GDP on listed firms' D/E ratios after 1994 (Panel B in Table 5.12) is that over the long term, economic growth expands a country's capital accumulation. More capital is thus available to firms for financing purposes, which could lead to higher D/E ratios.

The lagged repo rate was negative and insignificant for all listed firms before 1994 (Panel A in Table 5.12). However, after 1994 the lagged repo rate was significantly positive for all listed firms (Panel B in Table 5.12). A possible explanation for the significantly positive lagged D/E ratio is the effect of the decreasing trend in the repo rate between 1999 and 2005 on firms' capital usage. Due to favourite interest rates, firms possibly used more debt over the long term, which lead to an increase in their D/E ratios.

The regression coefficients of the lagged D/E, ROA, lagged ROA, ROE and the lagged ROE of all the delisted firms before 1994 (Panel C in Table 5.12) were significant at the 0.1 level or better. Concerning the delisted firms after 1994 (Panel D in Table 5.12), the regression coefficients of the lagged D/E, lagged GDP, ROA, lagged ROA, ROE and the lagged ROE were all significant at the 0.1 level or better. However, the coefficients of the other components were not statistically significant.

The significant results of the regression analyses on the delisted firms before and after 1994 were comparatively similar; however, the lagged GDP rate was insignificant in Panel C and negatively significant in Panel D of Table 5.12. A possible explanation is that when a country's economy grows due to an increase in capital, not all firms necessarily have access to these funds. Firms that have financial problems often experience difficulties to obtain debt capital, since they cannot provide sufficient guarantees. Therefore, over the long term, the D/E ratios of the delisted firms after 1994 decreased although GDP increased after 1994.

A possible explanation for the significant regression coefficients of the profitability ratios indicated in Panels C and D in Table 5.12 is the effects of the two opposing capital structure models. According to the trade-off model, there is a positive relationship between D/E and profitability, possibly indicated by the significantly positive ROE regression coefficients. In contrast, the pecking order model indicates a negative relationship between D/E and profitability, possibly indicated by the significantly negative ROA regression coefficients. However, the regression coefficients of the lagged ROA and ROE indicated the opposite relationships. A probable explanation for the positive regression coefficient of the lagged ROA and the negative regression coefficient of the lagged ROE, is that over time, firms can deviate from one capital structure model to include the benefits of the other model (Titman & Tsyplakov 2006:1; Tong & Green 2005).

It should be noted that the regression coefficient of the tax rate of all the listed firms before 1994 (Panel A in Table 5.12) and the regression coefficients of the tax rate and lagged tax rate of all the delisted firms before 1994 (Panel C in Table 5.12) were indicated as zero. The regression coefficients (with the exclusion of the intercept, lagged D/E and the profitability ratios) of all the variables in Panel C were not statistically significant with a p-value of 1. A possible explanation for the insignificant results is the highly significant correlations found between the tax rate, the repo rate and the other variables.

5.5.4 Regression analyses conducted on all the listed and delisted firms before and after 1994 (excluding the tax rate and the repo rate)

According to the trade-off capital structure model, the optimal D/E ratio results from a trade-off between the possible bankruptcy costs and the tax savings associated with the tax deductibility of interest paid on debt financing (Bradley et al. 1984:857). Highly significant correlations were indicated in Table 5.5 between the tax rate and the repo rate, as well as between these two variables and the median D/E. A higher tax rate is generally advantageous if a firm has a high D/E ratio, due to the tax deductibility of interest paid on debt financing. There is thus an inter-relationship between the repo rate and the tax rate. It should be considered that the GDP, repo rate, CPI and R/S exchange rate are determined by demand and supply in the economy. However, in contrast, the

South African government determines the tax rate. During the period under investigation, the tax rate continuously decreased.

The inter-relationship between the tax rate and interest paid on debt financing should be considered, since it possibly distorted the regression results indicated in Table 5.12. Therefore, the same regression analyses than those indicated in Table 5.12 are conducted, with the exclusion of the tax rate and the repo rate, to avoid the possible distortion of the results due to the inter-relationship between these variables. The results of the regression analyses on both listed and delisted before and after 1994, excluding the tax rate and the repo rate are indicated in Table 5.13.

Table 5.13: Regression analyses on all the listed and delisted firms before and after 1994 (excluding the tax rate and repo rate)

	Panel A		**Panel B**		**Panel C**		**Panel D**	
	Listed firms before 1994[a]		**Listed firms after 1994[b]**		**Delisted firms before 1994[c]**		**Delisted firms after 1994[d]**	
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	1.941	0.767	0.556***	<0.001	8.267	0.175	1.056	0.134
D/E_1	0.495***	<0.001	0.536***	<0.001	0.494***	<0.001	0.377***	<0.001
R/$ exchange rate	-0.122	0.915	0.009	0.439	0.604	0.566	-0.097	0.231
R/$ exchange rate_1	-0.715	0.481	-0.001	0.952	-1.663*	0.098	0.106*	0.089
GDP	22.424	0.197	-0.377	0.664	-34.396**	0.033	0.367	0.962
GDP_1	-12.976**	0.042	-0.341	0.698	15.789**	0.023	-7.147	0.162
ROA	-7.185***	<0.001	-7.092***	<0.001	-6.863***	<0.001	-5.402***	<0.001
ROA_1	3.289***	<0.001	3.263***	<0.001	2.275***	<0.001	1.583***	<0.001
ROE	3.390***	<0.001	3.590***	<0.001	2.910***	<0.001	2.895***	<0.001
ROE_1	-1.428***	<0.001	-1.752***	<0.001	-1.197***	<0.001	-0.980***	<0.001
CPI	8.331	0.628	-0.005	0.992	-20.058	0.175	2.625	0.583
CPI_1	-0.461	0.961	0.068	0.928	-14.779	0.141	-5.187	0.233

Note: a R-Square 0.545

b R-Square 0.661

c R-Square 0.519

d R-Square 0.464

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

-1 indicates a lagged variable

The listed firms after 1994 has the highest R^2 (0.661), followed by the R^2 (0.545) of the listed firms before 1994 and the R^2 (0.519) of the delisted firms before 1994. The delisted firms after 1994 has the lowest R^2 (0.464). These results are similar to the order of the regression coefficient of determination, with the inclusion of all the variables, indicated in Table 5.12.

Panel A in Table 5.13 indicates that the regression coefficients of the lagged D/E, lagged GDP, ROA, lagged ROA, ROE, and the lagged ROE of all the listed firms before 1994 were statistically significant at the 0.1 level or better. It thus seems that the inter-relationship between the tax rate and the repo rate did not have a significant impact on the regression results of the listed firms before 1994, since the regression results in Panel A of Table 5.13 were similar to the regression results indicated in Panel A of Table 5.12.

Concerning the regression coefficients of all the listed firms after 1994 (Panel B in Table 5.13) the intercept, lagged D/E, ROA, lagged ROA, ROE and lagged ROE were all statistically significant at the 0.1 level of significance or better. This differs from the regression results of all listed firms after 1994 with the inclusion of all the variables (Panel B in Table 5.12). When all the variables were considered, the regression coefficients of the lagged R/$ exchange rate, lagged GDP, lagged repo rate and lagged tax rate were also significant. It should be noted that the lagged GDP of all the listed firms before 1994 (Panels A in Tables 5.12 and 5.13) had significant negative regression coefficients, possibly due to the effect of the negative economic growth that occurred in South Africa during the period 1990 to 1992.

The regression coefficient of the lagged GDP of all listed firms after 1994 in Panel B of Table 5.12 was positively significant. In contrast, the regression coefficient of the lagged GDP in Panel B of Table 5.13 was insignificant. The inter-relationship between the tax rate and the repo rate, as well as the high correlation of these two variables with the other economic variables possibly distorted the lagged regression results of the economic variables.

In Panel C of Table 5.13, it is indicated that the following variables had significant regression coefficients at the 0.1 level or better: lagged D/E, lagged R/$ exchange rate, GDP, lagged GDP, ROA, lagged ROA, ROE and lagged ROE. In contrast, the regression analysis conducted on all the delisted firms before 1994 including all the

variables (Panel C in Table 5.12) did not indicate significant regression coefficients for the lagged R/$ exchange rate, GDP or the lagged GDP. It is thus possible that the strong correlation between the tax rate and the repo rate oppressed the regression results indicated in Table 5.12.

Perusal of Panel D in Table 5.13 indicates that the regression coefficients of the lagged D/E, lagged R/$ exchange rate, ROA, lagged ROA, ROE and lagged ROE of all the delisted firms after 1994 were all statistically significant at the 0.1 level or better. However, in contrast with these results, the regression results in Panel D of Table 5.12 did not indicate a significant regression coefficient for the lagged R/$ exchange rate, but for the lagged GDP.

The results of the delisted firms before and after 1994 (Panels C and D in Table 5.13) also differed concerning the GDP rate. The GDP of the delisted firms before 1994 was negatively significant, while the lagged GDP was positively significant. However, after 1994, the regression coefficients of the GDP and lagged GDP were insignificant. A possible explanation is the strong correlations found between the tax rate, repo rate and GDP (Table 5.5). When the tax rate and repo rate are excluded, the GDP is probably less influenced by changes in the other economic variables. The negative regression coefficient is then possibly the effect of the negative economic growth that occurred two years prior to the 1994 election. However, over the long term, the positive economic growth rate during 1989 to 1991 possibly lead to an increase in firms' debt usage, indicating that the effect of economic changes do not occur immediately but only after a period of time.

5.5.5 Regression analyses conducted on all the listed and delisted firms between 1989 and 2008, as well as all the firms before and after 1994 (excluding the tax rate and the repo rate)

In order to determine whether the inter-relationship between the tax rate and the repo rate distorted the regression results conducted on the listed and delisted firms, regression analyses were also conducted on all the listed and delisted firms over the 20 year study period, excluding the tax rate and repo rate. Regression analyses were also conducted for all the firms before and after 1994, in order to determine whether the results differ when both survivor and failure firms are included in the regression analysis. These results were compared to the results of the separate regressions

conducted on listed and delisted firms, indicated in Table 5.13. Table 5.14 indicates the results of the regression analyses conducted on all the listed and delisted firms in the 20 year period, as well as on all the firms before and after 1994 (including both listed and delisted firms), excluding the tax rate and the repo rate.

Table 5.14: Regression analyses on all the listed and delisted firms between 1989 and 2008, as well as all the firms before and after 1994 (excluding the tax rate and repo rate)

	Panel A		**Panel B**		**Panel C**		**Panel D**	
	All listed firms 1989-2008[a]		**All delisted firms 1989-2008[b]**		**All firms before 1994[c]**		**All firms after 1994[d]**	
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	0.526***	<0.001	1.204**	0.024	3.805	0.419	0.504***	<0.001
D/E_1	0.573***	<0.001	0.466***	<0.001	0.494***	<0.001	0.539***	<0.001
R/$ exchange rate	0.005	0.589	-0.048	0.363	0.454	0.585	0.011	0.260
R/$ exchangerate_1	0.002	0.851	0.035	0.416	-1.272*	0.080	-0.001	0.948
GDP	-0.288	0.697	-3.782	0.477	-0.883	0.944	-0.196	0.782
GDP_1	-0.360	0.587	-0.424	0.893	0.666	0.888	-0.029	0.969
ROA	-6.998***	<0.001	-5.683***	<0.001	-7.108***	<0.001	-6.613***	<0.001
ROA_1	3.514***	<0.001	1.817***	<0.001	2.957***	<0.001	3.088***	<0.001
ROE	3.486***	<0.001	2.734***	<0.001	3.236***	<0.001	3.397***	<0.001
ROE_1	-1.853***	<0.001	-0.950***	<0.001	-1.449***	<0.001	-1.713***	<0.001
CPI	0.177	0.694	1.410	0.657	-2.218	0.856	-0.187	0.711
CPI_1	0.027	0.968	-5.040*	0.091	-4.474	0.515	0.163	0.807

Note: a R-Square 0.656
b R-Square 0.458
c R-Square 0.509
d R-Square 0.632
*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level
-1 indicates a lagged variable

Perusal of Panel A in Table 5.14 indicates that the intercept, lagged D/E, ROA, lagged ROA, ROE and lagged ROE of all listed firms were significant at the 0.1 level or better. It is similar to the regression results of the listed firms indicated in Panels A and B of Table 5.13, except for the lagged GDP rate that was only statistically significant for

listed firms before 1994 (Panel A in Table 5.13). A possible explanation is that the negative economic growth experienced between 1990 and 1992 only influenced the capital structures of listed firms before 1994. When all the listed firms were considered (over the period 1989–2008) the effect became insignificant.

The following regression coefficients of all the delisted firms (Panel B in Table 5.14) were significant at the 0.1 level or better: the intercept, lagged D/E, ROA, lagged ROA, ROE, lagged ROE and lagged CPI. In contrast, when the delisted firms were considered before and after 1994, the R/$ exchange rate (Panels C and D in Table 5.13), as well as the GDP and lagged GDP (Panel C in Table 5.13) were statistically significant. Once again, it is possible that the effect of the negative economic growth between 1990 and 1992 only affected the D/E ratios of the listed firms before 1994. When all the delisted firms were considered, the effect became insignificant.

The lagged CPI of all the delisted firms had a significant negative regression coefficient (Panel B in Table 5.14). A possible explanation is Schall's (1984) view on the effect of inflation on debt financing. He stated that, during periods of high inflation, the after-tax return on shares is relatively higher than the return on bonds. Therefore, investors are expected to exchange debt financing for equity financing during inflationary periods. Firms' debt ratios are then expected to decrease. However, the effect of economic changes often only occurs after a period of time. Therefore, an increase in CPI can possibly lead to a decrease in firms' debt usage over the long term.

Concerning the regression coefficients of all the firms before 1994 (Panel C in Table 5.14), the lagged D/E, lagged R/$ exchange rate, ROA, lagged ROA, ROE and lagged ROE were statistically significant. These results were similar to the results indicated in Panels A and C in Table 5.13, except for the GDP that was significantly negative for the delisted firms before 1994 and the lagged GDP that was significantly negative for listed and significantly positive for delisted firms before 1994. In contrast, neither the GDP nor the lagged GDP were significant when all the firms (including both listed and delisted firms) before 1994 were considered (Panel C in Table 5.14). A possible explanation is that the positive and negative lagged GDP regression coefficients of the listed and delisted firms negated when all the firms were considered.

Perusal of Panel D in Table 5.14 indicates that the intercept, lagged D/E, ROA, lagged ROA, ROE and lagged ROE of all the firms after 1994 were significant at the 0.1 level

or better. These results were similar to the regression coefficients of all the listed and delisted firms after 1994 (Panels B and D in Table 5.13), except for the lagged R/$ exchange rate that was significantly positive for the delisted firms after 1994 and insignificantly negative for all the firms after 1994. A possible explanation is that the negative regression coefficient of the R/$ exchange rate of the listed firms after 1994 had the largest effect on the R/S exchange rate regression coefficient of all the firms (Panel D in Table 5.14).

The profitability and lagged profitability ratios indicated in Table 5.14 were all significant. The regression coefficients of ROA were negative (Panels A–D in Table 5.14), while the regression coefficients of ROE were positive (Panels A–D in Table 5.14). However, the regression coefficients of the lagged ROA were positive (Panels A–D in Table 5.14) while the regression coefficients of the lagged ROE were negative (Panels A–D in Table 5.14). A possible explanation is the effect of the two capital structure models on firms' D/E ratios. The trade-off model indicates a positive relationship between leverage and profitability while the pecking order model indicates a negative relationship between leverage and profitability. However, it is possible that firms can change their capital structure models over time or that the effect of these models only occurs after a period of time.

Significant differences were observed between the regression results conducted on all the firms (both listed and delisted firms) before and after 1994. In the following section, the Mann-Whitney U test is used to determine whether the sample firms' median D/E values differed before and after 1994.

5.6 The Mann-Whitney U test

The non-parametric Mann-Whitney U test is often used to compare the sums of ranked data groups when the data sets do not have normal distributions. Observations are ranked, tied and averaged in order to determine the sum of ranks for the two samples. If the sum of ranks is very different, the p-value will be small. A small p-value then leads to the rejection of the notion that the difference in medians is a coincidence. The conclusion can then be made that the populations have different median values. However, when a large p-value is observed, it cannot be stated that the median values differ (Sheskin 2004:423; Motulsky 1999).

In this study, the median values of all the firms between 1989 and 1994 were compared with the median values of all the firms between 1995 and 2008. The year 1994 was used to divide the data set into two samples in an attempt to determine the possible effect of the political and economical changes that took place in South Africa during the 1994 democratic election and the years to follow on firms' median D/E levels. For this study, an α-level of 0.05 was used. If the determined p-value is less than the level of significance, the conclusion can be made that the sample's median values differ. However, if the determined p-value is larger than the α-level, there is no compelling evidence for differing median values. Figure 5.10 illustrates the ranked Mann-Whitney U test results at a 0.05 significance level.

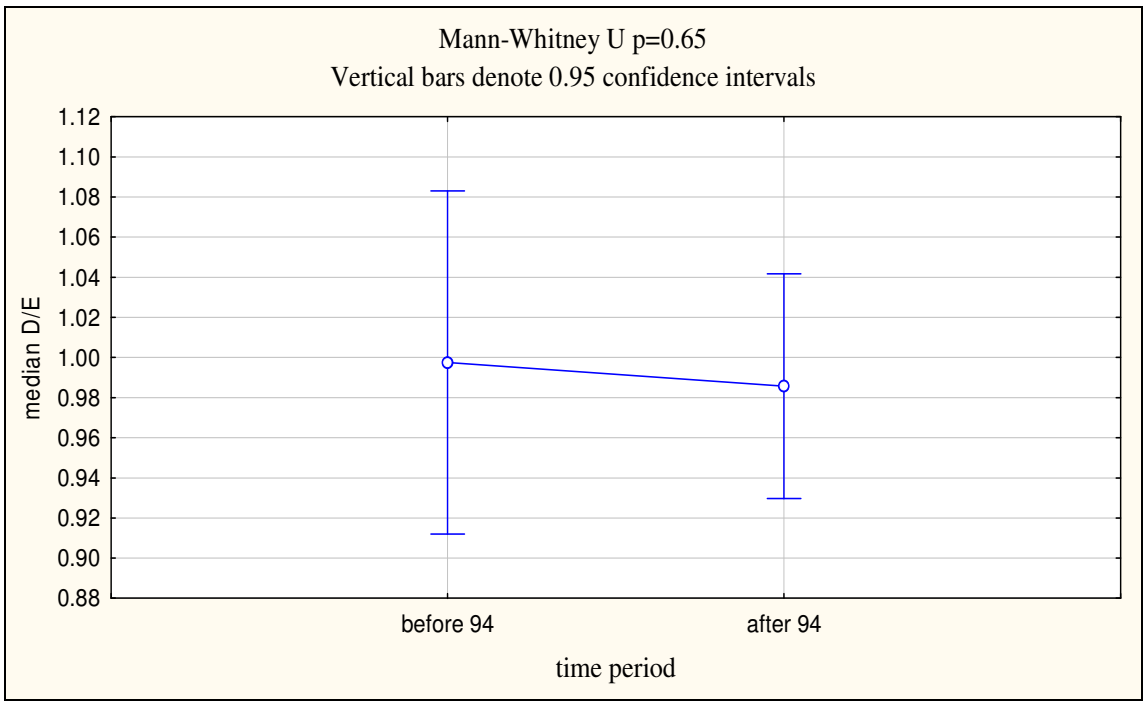

Figure 5.10: Mann-Whitney U confidence interval for all the firms between 1989 and 1994 and all the firms between 1995 and 2008

The determined p-value was 0.65. Since the p-value was higher than the α-level, it could not be stated that the firms' median values D/E values differed before and after 1994.

5.7 The split-middle technique

The split-middle technique is used to determine trends in data sets. Linear trend lines are plotted over various phases. The differing slopes of these lines are then compared in order to determine possible upward or downward trends. Linear trend lines were plotted

for the median D/E values between 1989 and 1994 and also between 1995 and 2008. It is illustrated in Figure 5.11.

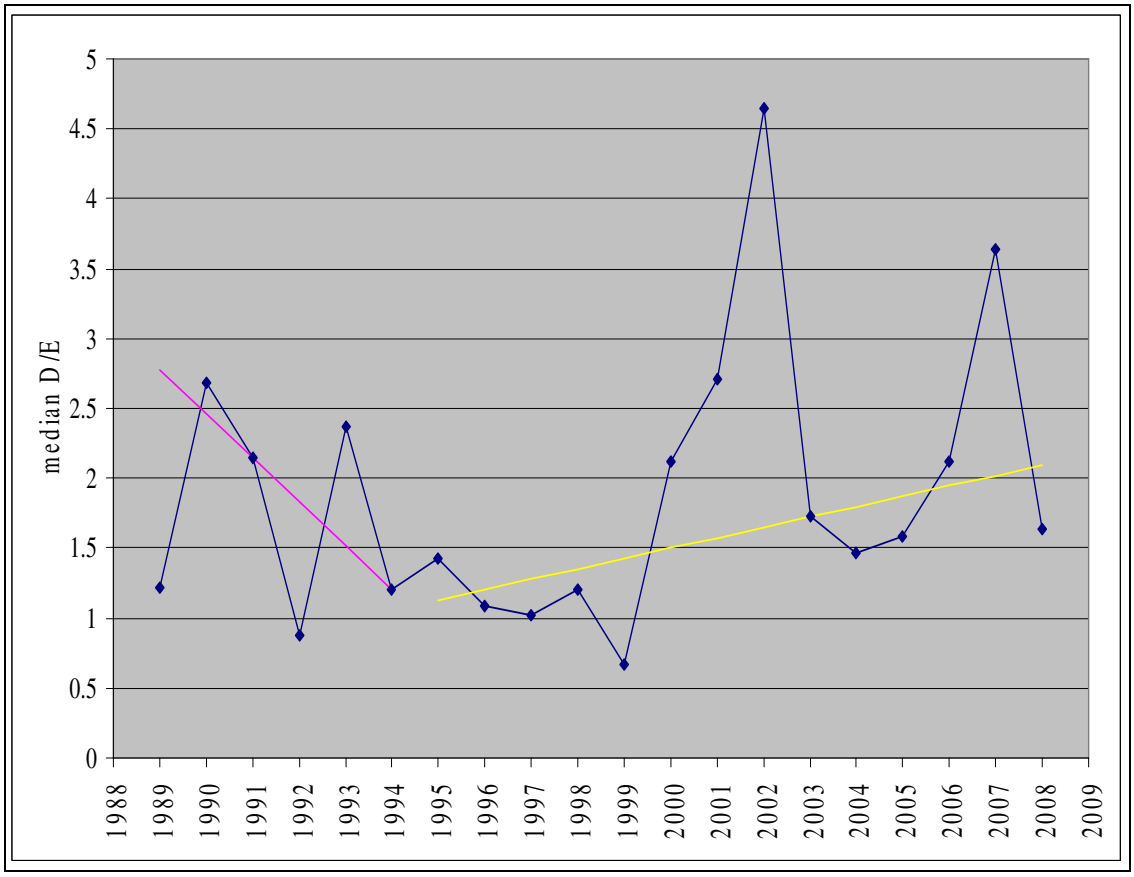

Figure 5.11: Split-middle line of trend estimation

Figure 5.11 indicated a downward trend in the median D/E values between 1989 and 1994. However, between 1995 and 2008, an upward trend was indicated. It thus appears that firms' median D/E ratios decreased between 1989 and 1994 and gradually increased between 1995 and 2008. However, it should be noted that there were only five data points before 1994. There was also high variance in the data points.

5.8 Summary

In this chapter, an attempt was made to determine the relationships between D/E, the profitability ratios and economic variables for a sample of South African listed industrial firms over the period 1989 to 2008.

Descriptive statistics were used to summarise the study's data set. The Kolmogorov-Smirnov test indicated that the data set was not normally distributed. Therefore, the non-parametric Spearman correlation was used to determine possible relationships

between the variables. Significant correlations were indicated amongst the economic variables as well as between D/E, the profitability ratios and most of the economic variables. However, the highly significant correlations found between the economic variables distorted the regression results. Therefore, regression analyses were conducted on all the variables and with the exclusion of some variables. The profitability ratios indicated statistically significant regression coefficients, which can possibly be explained by the two capital structure models, namely the trade-off and pecking order models. It should also be noted that the effect of changes in economic variables often do not occur immediately, but only after a period of time.

The non-parametric Mann-Whitney U test was used to determine possible differences in the median D/E values before and after 1994. The results of the Mann-Whitney U test indicated that firms' median values did not vary before and after 1994. It should be noted, however, that a possible upward trend in firms' D/E ratios after 1994 was indicated by the split-middle technique.

In the following chapter, conclusions are reported and recommendations are made, based on the results presented in this chapter.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

Prior capital structure research was often conducted based on data obtained from firms operating in developed countries. The majority of these studies did not focus on developing countries. However, more recent capital structure research is often conducted in both developed and developing countries, and the results obtained are then compared. It should also be noted that various capital structure studies reported contradictory results on the relationship between leverage and economic variables as well as the inter-relationships amongst economic variables. The primary objective of this study was therefore to investigate whether the capital structures of South African listed industrial firms are influenced by changes in the economical environment. For this purpose, the effect of firm-specific and economic variables on debt to equity (D/E) ratios was determined for a sample of South African listed industrial firms during the period 1989 to 2008.

A distinction was made between listed and delisted firms, in order to decrease survivorship bias. By including both successful and failed firms, the study's results were less affected by the successful firms, and the possible skewing of the results were decreased. The sample was also divided in years before and after 1994, in an attempt to determine the effect of the profound economic changes that occurred during 1994 and the following years on firms' capital structures.

The remainder of this chapter consists of four sections. The first section provides a summary of the results reported in the previous chapter. The second section consists of a number of conclusions that are based on these results. In the third section, recommendations are made regarding the implications of the results. The final section indicates the limitations of this study, and possibilities for future research are identified.

6.2 Summary

The primary research objective of this study was as follows:

- to determine whether the capital structures of South African listed industrial firms are influenced by changes in the South African economical environment.

Furthermore, the following secondary research objectives were also addressed:

- to determine the nature of the relationship among the variables;
- to determine the long-term trend of the relationship; and
- to determine which capital structure model is followed by South African listed industrial firms.

The primary financial objective of a firm should be the maximisation of its shareholders' wealth. This entails the maximisation of the firm's common share price. There are different factors that could have an influence on the firm's common share price, and different decisions and actions that managers can take in an attempt to maximise the firm's share price. These include, amongst others, investment and finance decisions. The investment decisions focus on value-creating investment portfolios. The finance decisions influence the firm's capital structure and the cost of capital.

Capital structure theory entails the quest for an optimal capital structure. Firms can use different combinations of debt and equity. Modigliani and Miller (1963; 1958) are regarded as pioneers of capital structure theory. They indicated that capital structure is irrelevant to a firm's value in a perfect capital market. However, when taxes, bankruptcy costs and asymmetric information are considered, a firm's leverage could influence its value. Therefore, firms should choose the combination of debt and equity that will maximise their values and minimises their costs.

In addition, a firm's profitability ratio could also influence its D/E ratio. There are two main capital structure models, namely the trade-off and pecking order models. The trade-off theory is a target-adjusted capital structure model, where a firm progressively adjusts towards a target debt ratio. A firm trades-off the tax savings (due to the interest deductibility of debt financing) and the possibility of going bankrupt, until it reaches an optimal capital structure. In practice, however, firms often deviate from their optimal capital structure to incorporate the benefits of the pecking order model.

According to the pecking order model, there is no optimal capital structure. In contrast, a firm prefers to use a financing hierarchy. Internally generated funds are preferred, followed by debt and as a last resort, when firms have no more debt capacity, equity will be issued. The rationale for this hierarchical structure is that internal funds are considered cheaper than debt financing, while debt financing is considered cheaper and less restricted than new equity issues. Equity can convey a negative market signal, indicating that the firm's shares are overvalued. Therefore, equity is only issued as a last resort.

The two capital structure models indicate opposing relationships between capital structure and profitability. According to the trade-off theory, there is a positive relationship between profitability and leverage. More profitable firms will thus use more debt financing, mainly due to the tax advantage. However, the pecking order capital structure theory indicates a negative relationship between leverage and profitability. A less profitable firm will thus be willing to use more debt financing, since less internal funds are available for financing purposes.

However, firms operating within a country are not only influenced by firm-specific factors (such as profitability), but economic factors (such as gross domestic product (GDP)) can also have an influence on firms. Therefore, firm managers should consider both firm-specific factors and the economic environment within the country where they are operating when conducting finance decisions. During the study period, South Africa experienced a highly variable economic environment, thus providing the ideal environment to study the effect of economical changes on firms' capital structures within a developing country. The economic factors of importance to this study were the growth rate, interest rate, inflation rate, R/$ exchange rate and the tax rate.

In this study, the growth rate was indicated by changes in the GDP. Countries are generally classified into *developed*, *less developed* and *developing* countries according to their GDP measures. Financial factors play a central role in the economic growth and development of a country, and foreign direct investments (FDI) often contribute to growth in developing countries. However, South Africa still receives relatively limited FDI compared to other developing countries. South African corporate managers should thus consider foreign and domestic capital, as well as internally generated funds when conducting financial decisions.

Managers should also consider the interest rate within a country, since it determines the cost of debt financing. In South Africa, the repo rate is the rate that the South African Reserve Bank (SARB) charges for borrowed cash reserves. This determines the cost of debt financing provided by banks. If the interest rate increases, firms are expected to use less debt financing, due to an increase in the cost of debt financing. However, firms should also consider the long-term trend in interest rates, in order to benefit from interest savings due to moderate long-term interest rates. According to the Fisher equation, interest and inflation rates tend to move in the same direction.

Inflation is the sustained increase in the general price level of an economy. The inflation rate (indicated by changes in the consumer price index (CPI)) is the rate at which price levels increase. The SARB follows an inflation-targeting policy with a target inflation rate of 3% to 6%. According to the Fisher equation, the nominal interest rate is equal to the real interest rate plus an inflation premium. Therefore, an inflation rate increase generally leads to an increase in the nominal interest rate, which has an effect on a firm's capital structure. If the cost of debt financing (interest paid) increases, firms tend to use less debt financing. The inflation rate also influences the other economic factors within a country, such as the exchange rate. An inflation increase indicates that the value of the rand depreciates by the CPI % in terms of the products and services that can be bought with one rand.

The exchange rate indicates the number of units of a given country's currency that can be bought with one unit of another currency. South Africa follows a floating exchange rate system, where the exchange rate is allowed to determine its own level in the market without much government intervention. Financial and capital flows (including FDI) to a country are subject to exchange rates. Firms should therefore consider the effect of exchange rate appreciation or depreciation on the availability of foreign capital for financing purposes.

When a country experiences an unemployment problem, the country's interest rate is often decreased. The growth rate, interest rate, inflation rate and exchange rate then have a combined economic effect. Investors tend to withdraw their capital due to a decrease in the interest rate earned on their investments, leading to a capital fleet and consequent currency depreciation. The country's prices will then become cheaper in the world market, which will increase sales and consequently production, employment and growth within the country.

In this study, the effects of economic changes on capital structure were investigated. The study was conducted for a sample of South African industrial firms listed on the JSE Ltd over the period 1989 to 2008. During the period under investigation, the South African economy experienced profound economic changes. The data required to calculate the various measures were obtained from the McGregor BFA database (2009). This database contains standardised financial statement data for both listed and delisted firms. The economical data were obtained from the SARB and South African Revenue Service (SARS) (2008).

Standardised financial statement data were used instead of published financial statements, since the format of published statements may vary amongst firms. Both listed and delisted industrial firms were included in the sample, in order to decrease survivorship bias. If only listed firms were included, it could have caused the study's results to skew higher. However, the inclusion of both successful and failure firms should reduce the possible skewing of results. The data set was also divided in years before 1994 and years after 1994. This was done in an attempt to determine the effect of the economic changes that occurred in South Africa during the 1994 democratic election and the years to follow on firms' capital structures.

Various data analysis techniques were used to analyse the collected data. Descriptive statistics were used to determine the nature of the data set. The results of the skewness and kurtosis statistics, as well as the Kolmogorov-Smirnov test, indicated that the data set did not have a normal distribution. Since median values are non-parametric and less sensitive to the effect of outlier values, these values were used instead of the mean values to conducted correlation and regression analyses.

The non-parametric Spearman correlation was used to determine the possible relationships between the firm-specific and economic variables. As expected, the relationships between the repo rate and median D/E was significantly negative while the R/$ exchange rate was positively correlated to the median D/E. Firms generally use less debt financing when the cost of debt financing increases. An appreciation of the Rand is expected to lead to an inflow of money into the country as the profits will be more in the foreign country. The foreign firm however receives less rands when making the investment. More capital is thus available, possibly influencing firms' D/E ratios. However, the relationship between the tax rate and the median D/E was significantly

negative. The decreases in the tax rate during the study period possibly influenced the relationship between these variables negatively.

As expected, the economic variables were also highly correlated, since these variables often have an influence on each other. Considering the profitability ratios, the GDP, repo rate and tax rate were significantly correlated with both ROA and ROE. The growth in a country is often negatively influenced by a decline in investments due to an interest rate decrease. The consequent capital fleet then leads to a decrease in the currency's value. The country's products become cheaper in the world market, leading to an increase in sales, production and growth. It thus seems that an interest rate change (increase or decrease) and the consequent effect on the inflation rate and exchange rate result in the significant correlation found between the GDP and profitability ratios. Logically, a firm's profitability ratio is expected to increase when the tax rate decreases.

The correlation analyses indicated significant relationships between some of the variables. However, it cannot be used to determine causation. Regression analyses were therefore conducted to determine how the value of the dependent variable changes when one of the independent variables is changed and the other independent variables are held fixed. In this study, a TSCSREG (time-series cross-section regression) procedure was used. The regression model was based on a model used by Fan et al. (2008) and regards panel data sets that consist of time-series observations on each of several cross-sectional units. This regression model is thus appropriate for this study's data set, since it consists of both panel and economical data. One-year lags were also built into the model, to accommodate for the effect of economic changes that often only occur after a certain period.

Since the data set contained some outlier values, regression analyses were conducted on all the variables, with and without the outlier values. When the outlier values were excluded, stronger results were obtained. When considering the two profitability ratios (ROA and ROE), statistically significant correlation and regression results were indicated with some independent variables. Generally, firms follow one of the two capital structure models (trade-off or pecking order model) which results either in a positive or negative relationship between D/E and profitability. However, support was found for both the trade-off and pecking order capital structure models. A possible reason for the contrasting results is that the two profitability ratios impacted on each other. Therefore, the inter-relationship between the profitability ratios ROA and ROE

were also investigated. The results of the regression analyses with the inclusion of the variable ROA-ROE revealed significantly stronger results. These results possibly indicate that ROA and ROE should be considered together, since the combined effect of these variables could have an important impact on firms' financing decisions.

Regression analyses were also conducted on all the firms before and after 1994, as well as all the listed and all the delisted firms for the period 1989 to 1994 and 1995 to 2008. The results indicated that the effect of the economic variables often occurred after a lagged period and in some cases differed for listed and delisted firms. The effect of some economic variables on firms' capital structures before 1994 also differed from the effect of economic variables on firms' capital structures after 1994. However, the results of the regression analyses were possibly influenced by the highly significant correlations found between the tax rate and the repo rate, as well as between these two variables and the other economic variables.

Therefore, the regression analyses were also conducted on all the variables, excluding the tax rate and repo rate. The consideration of the inter-relationship between the tax rate and the repo rate had a significant impact on the firms' (listed and delisted) results before and after 1994. The results differed mainly in terms of the GDP and R/$ exchange rate. It should be considered that these variables had an important inter-relationship with the other economic variables that could be influenced by the varying financial and economic circumstances before and after 1994.

6.3 Conclusions

The underlying hypotheses of this study were indicated in Chapter 1:

H_0: There is no relationship between the capital structures of South African listed industrial firms and the changing economical environment.

H_A: There is a relationship between the capital structures of South African listed industrial firms and the changing economical environment.

Based on these hypotheses, the following conclusions are relevant to this study:

- Although the correlation analyses reported strong relationships between the economic variables, all of these variables did not have a significant impact on the firms' capital structures. This is possibly due to the inter-relationships

between these variables, where the change in one variable indirectly influences the firms' capital structure decisions through its effect on the other variables over time. The effect of economic variables is thus often not seen immediately, but only after some time. It should also be considered that there were many economic changes over the 20-year study period that could influence firms' capital structures. Therefore, the simultaneous effect of all the economic changes probably had a less significant effect on capital structure, since these factors could counteract one another.

- The tax rate is highly correlated with the repo rate and the other economic variables. According to the trade-off capital structure model, firms trade-off the benefits of debt financing (the interest tax deductibility) and the possibility of going bankrupt. The combined effect of these two variables had a distorting effect on the regression analyses. When the tax rate and the repo rate were excluded from the regression analyses, the results were still less significant than expected. A possible explanation is that the effect of the economic variables only occurs after a lagged period. In this study, one-year lags were considered. However, it is possible that the effect of changes in the economic variables would become more significant after a longer period.

- The profitability ratios and D/E indicated highly significant correlation and regression results. However, it seemed that the ROA and ROE ratios should not be considered independently but simultaneously. The combined effect of these variables had an important impact on the observed firms' D/E ratios. Based on this, support was found for both the pecking order and trade-off capital structure models. These results thus support the notion that firms can deviate from their capital structure model to incorporate the benefits of another capital structure model. A firm can also possibly use a combination of the two capital structure models.

- Significantly different results were indicated when the data set was divided into firms (listed and delisted) before and after 1994. It seems that economic changes impacted differently on financially successful and failure firms before and after 1994. Changes in the repo rate, inflation rate, tax rate, growth rate and the R/$ exchange rate have either a direct or indirect impact on the debt capital available to firms for financing purposes. For example, when a decrease in the repo rate

makes debt capital more beneficial to firms, financially successful firms can use more debt capital, since they are able to provide sufficient guarantees. However, firms that experience financial difficulties often do not have access to additional debt capital, since they cannot provide guarantees. Changes in economic variables that make debt usage more advantageous to firms often have a less significant impact on delisted firms than listed firms. Generally, delisted firms may struggle financially and therefore they often could not gain access to additional debt capital.

6.4 Recommendations

Based on the results reported in the preceding chapter and the conclusions that were reached, the following recommendations are presented:

- It was indicated that economic variables have an important impact on firms' capital structures. In addition, it is also important to consider the impact of these economic variables on each other. The impact of the economic variables on each other often causes changes in firms' capital structures. The relationship between a specific economic variable and the D/E ratio is therefore often not direct but indirect.
- In this study, the focus was on the D/E ratio, profitability ratios (ROA and ROE) and the economic variables (GDP rate, CPI rate, repo rate, R/$ exchange rate and tax rate). However, other firm-specific variables could also have an influence on firms' capital structure decisions, such as the firm's size and growth. For example, growth within the economy can possibly impact on firm-level growth. It is expected that the effect of economic changes on other firm-level changes will also only be seen after a lagged period.
- The pecking order and trade-off models should not be regarded as mutually exclusive. When a firm's managers consider both ROA and ROE, the combined effect of these ratios could lead to situations where firms may choose to use a combination of these models.

6.5 Research challenges and future research

A number of research challenges were faced during this study. The following challenges are emphasised:

- In this study, both listed and delisted firms were considered, in an attempt to decreases survivorship bias. However, since data should be available for consecutive years in order to reflect the true nature of the data, only firms with data available for more than five years were considered. A total of 151 firms (289 observations) were therefore excluded from the sample. Although it appears to be a large group of firms, they contributed only a small number of observations. These firms could possibly have had an impact on the results had they been included in the data set.
- Other techniques could be considered to determine the possible relationship between the economic variables and capital structure. Event studies were considered, but could not be applied to the methodology for this study. If the methodology of event studies could be adapted, it can possibly be used to evaluate the effect of economic events on firms' capital structure decisions.

Based on the conclusions and recommendations indicated in the preceding sections, future research focusing on the following aspects could build on the results presented in this study:

- In this study, a 20-year study period was considered, with one-year lags built into the regression model. In future studies, the study period may be extended, in order to build more lags into the model, since the effect of economic changes could possibly occur after an even longer lagged period. If the study period is extended, the lagged economic variables could possibly have a more significant impact on firms' capital structures over the long term.
- Outlier values were excluded from the sample when conducting some of the regression analyses. This was done in attempt to avoid possible distortion of the results due to these outlier values. In future research, instead of only removing these outlier values, possible causes for the outliers could be examined.
- From the results obtained in this analysis, the combined effect of the profitability ratios had a significant impact on the observed firms' D/E ratios. Generally,

firms follow either the trade-off capital structure model or the pecking order model. A future study could, therefore, focus on the development of a new capital structure model. The focus of such a model could be to combine the two capital structure models where firms are allowed to deviate between these models according to changing circumstances. The optimal combined model will thus not be fixed, but will depend on the firms' financial circumstances.

REFERENCES

Aghion, P. & Durlauf, S.N. (2005). *Handbook of economic growth*. Amsterdam: North Holland.

Akritas, M.G. & Politis, D.N. (2003). *Recent advances and trends in nonparametric statistics*. Amsterdam: Elsevier.

Allen, A.T. (1999). *SAS/ETS user's guide*. Version 8. North Carolina: SAS Institute.

Arellano, M. (2003). *Panel data econometrics*. Oxford: Oxford University Press.

Aron, J. & Meullbauer, J. (2002). Interest rate effects on output: Evidence from a GDP forecasting model for South Africa. *Staff Papers – International Monetary Fund* 49:185–213.

Aron, J. & Meullbauer, J. (2005). Monetary policy, macro-stability and growth: South Africa's recent experience and lessons. *World Economics* 6(4):123–147.

Baker, M. & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance* 58:1–32.

Barnea, A., Haugen, R.A. & Senbet, L.W. (1981). Market imperfections, agency problems and capital structure: A review. *Financial Management* 10(3):7–22.

Barro, R.J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics* 106(2):407–443.

Barton, S.L. & Gordon, P.J. (1988). Corporate strategy and capital structure. *Strategic Management Journal* 9(6):623–632.

Barton, S.L., Hill, N.C. & Sundaram, S. (1989). An empirical test of stakeholder theory predictions of capital structure. *Financial Management* 18:36–44.

Baskin, J. (1989). An empirical investigation of the Pecking Order Hypothesis. *Financial Management* 18:26–35.

Beaver, W.H. & Ryan, S.G. (2000). Biases and lags in book value and their effects on the ability of the book-to-market ratio to predict book return on equity. *Journal of Accounting Research* 38:127–148.

Bebchuk, L.A., Kraakman, R. & Triantis, G. (1999). Stock pyramids, cross-ownership and dual class equity: The mechanisms and agency costs of separating control from cash-flow rights. *Harvard Law and Economics Discussion Paper* 249:1–27.

Belgrade, N., Benhamou, E. & Koehler, E. (2004). A market model for inflation. *SSRN Working Paper Series* January:1–15.

Blanchard, O. (2006). *Macroeconomics*. 4th edition. New Jersey: Pearson.

Bodie, Z., Kane, A. & Marcus, A.J. (2003). *Essentials of investments*. New York: McGraw-Hill.

Booth, L., Aivazian, V., Demirgüç-Kunt, A. & Maksimovic, V. (2001). Capital structure in developing countries. *The Journal of Finance* 56:87–130.

Borensztein, E., De Gregorio, J. & Lee, J. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics* 45:115–135.

Bornschier, V., Dunn, C.C. & Rubinson, R. (1987). Cross-national evidence of the effects of foreign investment and aid on economic growth and inequality: A survey of findings and reanalysis. *American Journal of Sociology.* 84(3):651-683.

Boskin, M.J. (1978). Taxation, saving and the rate of interest. *The Journal of Political Economy* 86(2):3–27.

Bowman, J. (1980). The importance of a market value measurement of debt in assessing leverage. *Journal of Accounting Research* 18:242–254.

Bradley, M., Jarrell, G.A. & Kim, E.H. (1984). On the existence of an optimal capital structure: Theory and evidence. *The Journal of Finance* 39(3):857–878.

Brennan, M.J. & Schwartz, E.S. (1978). Corporate income taxes, valuation and the problem of optimal capital structure. *The Journal of Business* 51:103–114.

Brigham, E.F. & Daves, P.R. (2004). *Intermediate financial management*. 8th edition. Mason: Thomson.

Brigham, E.F. & Houston, J.F. (1998). *Fundamentals of financial management*. 8th edition. Mason: Thomson.

Calder, B.J., Phillips, L.W. & Tybout, A.M. (1982). The concept of external validity. *The Journal of Consumer Research* 9(3):240–244.

Calvo, G.A., Leiderman, L. & Reinhart, C.M. (1993). Capital inflows and real exchange rate appreciation in Latin America. *Staff Papers – International Monetary Fund* 40:108–151.

Campa, J.M. & Goldberg, L.S. (1999). Investment, pass-through and exchange rates: A cross-country comparison. *International Economic Review* 40(2):287–314.

Campbell, D. & Stanley, J. (1963). *Experimental and quasi-experimental designs*. Chicago: Rand McNally.

Cass, D. (1965). Optimum growth in an aggregative model of capital accumulation. *The Review of Economic Studies* 32(3):233–240.

Chari, V.V., Kehoe, P.J. & McGrattan, E.R. (2002). Can sticky price models generate volatile and persistent real exchange rates? *Review of Economic Studies* 69:533–563.

Chafouleas, S., Riley-Tillman, T.C. & Sugai, G. (2007). *Behavioral assessment: Informing intervention and instruction*. New York: Guilford.

Chen, A.H. & Boness, A.J. (1975). Effects of uncertain inflation on the investment and financing decisions of a firm. *The Journal of Finance* 30(2):469–483.

Chirinko, R.S. & Singha, A.R. (2000). Testing static trade-off against pecking order models of capital structure: A critical comment. *Journal of Financial Economics* 58:417–425.

Coldwell, D. & Herbst, F. (2004). *Business research*. Cape Town: Juta.

Cooper, I. & Kaplanis, E. (1994). Home bias in equity portfolios, inflation hedging, and international capital market equilibrium. *The Review of Financial Studies* 7:45–60.

Corder, G.W. & Foreman, D.I. (2009). *Non-parametric statistics for non-statisticians: A step-by-step approach*. New Jersey: Wiley.

Correia, C. & Cramer, P. (2008). An analysis of cost of capital, capital structure and capital budgeting practices: A survey of South African listed companies. *Meditari Accountancy Research* 16(2):31–52.

Cramer, D. (1994). *Introducing statistics for social research: Step-by-step calculations and computer techniques using SPSS*. London: Routledge.

Creswell, J.W. (2002). *Research design: Qualitative, quantitative and mixed methods approaches*. 2nd edition. London: Sage.

Crowder, W.J. & Hoffman, D.L. (1996). The long-run relationship between nominal interest rates and inflation: The Fisher equation revisited. *Journal of Money, Credit and Banking* 28:102–118.

Darby, M.R. (1975). The financial and tax effects of monetary policy on interest rates. *Economic Inquiry* 13:266–276.

De Angelis, C., Aziakpono, M.J. & Faure, A.P. (2005). The transmission of monetary policy under the repo system in South Africa: An empirical analysis. *The South African Journal of Economics* 73(4):657–673.

DeAngelo, H. & Masulis, R. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics* 8:3–29.

De Jager, J. (2008). Panel data techniques and accounting research. *Meditari Accountancy Research* 16(2):53–68.

De Miguel, A. & Pindado, J. (2001). Determinants of capital structure: New evidence from Spanish panel data. *Journal of Corporate Finance* 7:77–99.

Demirgüç-Kunt, A. & Maksimovic, V. (1999). Institutions, financial markets and firm debt maturity. *Journal of Financial Economics* 54:295–336.

Demirgüç-Kunt, A. & Vojislav, M. (1996). *Financial constraints, uses of funds and firm growth: An international comparison*. Mimeo: World Bank.

Desai, M.A., Foley, C.F. & Hines, J.R. (2004). A multinational perspective on capital structure choice and internal capital markets. *The Journal of Finance* 59(6):2451–2487.

De Vaus, D. (2002). *Surveys in social research*. 5th edition. New South Whales: Allen & Unwin.

Devereux, M.B. & Engel, C. (1998). Fixed vs. floating exchange rates: How price setting affects the optimal choice of exchange-rate regime. *NBER Working Paper Series* 6867:1–51.

De Wet, J.H.V.H. (2006). Determining the optimal capital structure: A practical contemporary approach. *Meditari Accountancy Research* 14(2):1–16.

Diggle, P., Heagerty, P., Liang, K.L. & Zeger, S. (2002). *Analysis of longitudinal data*. 2nd edition. Oxford: Oxford University Press.

Dominguez, K.M.E. & Tesar, L.L. (2006). Exchange rate exposure. *Journal of International Economics* 68:188–218.

Dornbusch, R. (1980). Exchange rate risk and the macroeconomics of exchange rate determination. *NBER Working Paper Series* 493:1–36.

Dornbusch, R. & Reynoso, A. (1989). Financial factors in economic development. *The American Economic Review* 79(2):204–209.

Drobetz, W. & Wazenried, G. (2006). What determines the speed of adjustment to the target capital structure? *Applied Financial Economics* 16:941–958.

Easterly, W. & Rebelo, S. (1993). Fiscal policy and economic growth: An empirical investigation. *NBER Working Paper Series* 4499:1–22.

Eaton, J. (1981). Fiscal policy, inflation and the accumulation of risky capital. *The Review of Economic Studies* 48(3):435–445.

Edwards, C. (1998). Financing faster growth in South Africa: The case for reforming the financial sector. *Transformation* 35:49–76.

Eishengreen, B. & Hausmann, R. (1999). Exchange rates and financial fragility. *NBER Working Paper Series* 7418:1–54.

Eldomiaty, T.I. (2007). Determinants of corporate capital structure: Evidence from an emerging economy. *International Journal of Commerce and Management* 17(2):25–43.

Erhardt, M.C. & Brigham, E.F. (2003). *Corporate finance – a focused approach*. Mason: Thomson.

Eriksson, M. & Hede, J. (2000). *Optimal capital structure*. Göteborg: Graduate Business School.

Fama, E.F. & Miller, M.H. (1972). *The theory of finance*. New York: Holt, Rinehart and Winston.

Fan, J.P.H., Titman, S. & Twite, G. (2008). An international comparison of capital structure and debt maturity choices. *SSNR Working Paper Series* 1 October:1–48.

Fedderke, J.W. & Schaling, E. (2005). Modeling inflation in South Africa: A multivariate cointegration analysis. *The South African Journal of Economics* 73:79–92.

Fischer, E.O., Heinkel, R. & Zechner, J. (1989). Dynamic capital structure choice: Theory and tests. *The Journal of Finance* 44:19–40.

Fisher, I. (1930). *The theory of interest as determined by impatience to spend income and opportunity to invest it*. New York: Macmillan.

Flood, R.P. (1979). Capital mobility and the choice of exchange rate system. *International Economic Review* 20(2):405–416.

Frank, M.Z. & Goyal, V.K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics* 67:217–248.

Frankel, J.A. & Froot, K.A. (1987). Using survey data to test standard propositions regarding exchange rate expectations. *The American Economic Review* 77:133–153.

Frees, E. (2004). *Longitudinal and panel data: Analysis and applications in the social sciences*. New York: Cambridge University Press.

Friedman, M. (1953). *Essays in positive economics*. 8th edition. Chicago: University of Chicago Press.

Friend, I. & Lang, H.P. (1988). An empirical test of the impact of managerial self-interest on corporate capital structure. *The Journal of Finance* 43(2):271–281.

Froot, K.A. & Stein, J.C. (1991). Exchange rates and foreign direct investment: An imperfect capital markets approach. *The Quarterly Journal of Economics* 106(4):1191–1217.

Ghauri, P.N., Gronhaug, K. & Kristianslund, I. (1999). *Research methods in business studies: A practical guide*. New York: Prentice Hall.

Glass, G.V. (1976). Primary, secondary and meta-analysis of research. *Educational Researcher* 5(10):3–8.

Glyn, A. (1997). Does aggregate profitability really matter? *Cambridge Journal of Economics* 21:593–619.

Goldstein, R., Ju, N. & Leland, H. (2001). An EBIT-based model of dynamic capital structure. *Journal of Business* 74(4):483–512.

Gölin, I. & Withvoet, M. (2001). *Managing the dynamics of e-commerce: The importance of competitive intelligence*. Göteborg: Graduate Business School.

Gqwaru, U. & Mohamed, S. (2008). Competition policy and the evolving global corporate structure. Paper delivered at the Second Annual Competition Commission, Tribunal and Institute Conference on Competition Law, Economics and Policy in SA, Johannesburg, University of the Witwatersrand, 6 June.

Green, J.H. (1996). Inflation targeting: Theory and policy implications. *Staff Papers – International Monetary Fund* 43(4):779–795.

Grier, K.B. & Perry, M.J. (2000). The effects of real and nominal uncertainty on inflation and output growth: Some Garch-M evidence. *Journal of Applied Econometrics* 15:45–58.

Grossman, S.J. & Stiglitz, J.E. (1977). On value maximization and alternative objectives of the firm. *The Journal of Finance* 32(2):389–402.

Harris, M. & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance* 46:297–355.

Hatfield, G.B., Cheng, L.T.W. & Davidson, W.N. (1994). The determinants of optimal capital structure: The effect of firm and industry debt ratios on market value. *Journal of Financial and Strategic Decisions* 7(3):1–13.

Hatzinikolaou, D., Katsimbris, G.M. & Noulas, A.G. (2002). Inflation uncertainty and capital structure evidence from a pooled sample of the Dow-Jones industrial firms. *International Review of Economics and Finance* 11:45–55.

Haugen, R.A. & Senbet, L.W. (1978). The insignificance of bankruptcy costs to the theory of optimal capital structure. *The Journal of Finance* 33(2):383–393.

Higgins, R.C. (1981). Sustainable growth under inflation. *Financial Management* 10(4):36–40.

Hinton, P.R. (2004). *Statistics explained*. 2nd edition. New York: Routledge.

Hochman, S. & Palmon, O. (1983). The irrelevance of capital structure for the impact of inflation on investment. *The Journal of Finance* 38(3):785–794.

Hough, J. & Neuland, E. (2007). *Global business: Environments and strategies*. 3rd edition. Cape Town: Oxford Southern Africa.

Hovakimian, A., Hovakimian, G. & Tehranian, H. (2004). Determinants of target capital structure: The case of dual debt and equity issues. *Journal of Financial Economics* 71:517–540.

Hovakimian, A., Opler, T. & Titman, S. (2001). The debt-equity choice. *Journal of Financial and Quantitative Analysis* 36:1–24.

Huang, R. & Ritter, J. (2005). *Testing the market timing theory of capital structure.* Working Paper. Gainesville, FL: University of Florida.

Israel, R. (1991). Capital structure and the market for corporate control: The defensive role of debt financing. *The Journal of Finance* 46(4):1391–1409.

Jalilvand, A. & Harris, R.S. (1984). Corporate behavior in adjusting to capital structure and dividend targets: An econometric study. *The Journal of Finance* 39:127–145.

Jobson, J.D. (1991). *Applied multivariate data analysis*. New York: Springer.

Jonsson, G. (2001). Inflation, money demand, and purchasing power parity in South Africa. *Staff Papers – International Monetary Fund* 48(2):243–265.

Kaempfer, W.H. & Moffett, M.H. (1988). Impact of anti-apartheid sanctions on South Africa: Some trade and financial evidence. *Contemporary Policy Issues* 6:118–129.

Kaldor, N. (1957). A model of economic growth. *The Economic Journal* 67(268):591–624.

Kandel, S., Ofer, A.R. & Sarig, O. (1996). Real interest rates and inflation: An ex-ante empirical analysis. *The Journal of Finance* 51:205–225.

Kanji, G.K. (1998). *100 statistical tests*. London: Sage.

Kasozi, J. & Ngwenya, S. (2009). *The capital structure practices of listed firms on the Johannesburg Securities Exchange (JSE Ltd) – an empirical study*. Port Elizabeth: The Southern Africa Institute for Management Scientists (SAIMS).

Kayhan, A. & Titman, S. (2007). Firms' histories and their capital structures. *Journal of Financial Economics* 83:1–32.

Khabo, V. & Harmse, C. (2005). The impact of monetary policy on the economic growth of a small and open economy: The case of South Africa. *South African Journal of Economic and Management Sciences* 8(3):348–362.

Kim, E.H. (1978). A mean-variance theory of optimal capital structure and corporate debt capacity. *The Journal of Finance* 33:45–63.

Kim, M.K. & Wu, C. (1988). Effects of inflation on capital structure. *The Financial Review* 23(2):183–200.

King, R.G. & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics* 108(3):717–737.

Krugman, P. (1986). Pricing to market when the exchange rate changes. *NBER Working Paper Series* 1962:1–34.

Leland, H.E. (1994). Corporate debt value, bond covenants and optimal capital structure. *The Journal of Finance* 49(4):1213–1252.

Levine, D.M., Stephan, D., Krehbiel, T.C. & Berenson, M.L. (2001). *Statistics for managers: Using Microsoft Excel*. 4th edition. New York: Prentice Hall.

Levine, D.M. & Stephan, D.F. (2005). *Even you can learn statistics: A guide for everyone who has ever been afraid of statistics*. New York: Pearson.

Levine, R. (1991). Stock markets, growth and tax policy. *The Journal of Finance* 46(4):1445–1465.

Levine, R. (1997). Financial development and economic growth: Views and agendas. *Journal of Economic Literature* 34(2):688–726.

Levine, R. & Zervos, S. (1998). Stock markets, banks and economic growth. *The American Economic Review* 88(3):537–558.

Lewis, J.D. (2002). Promoting growth and employment in South Africa. *Africa Region Working Paper Series* 32:1–29.

Lilliefors, H.W. (1967). On the Kolmogorov-Smirnov test for normality with mean and variance unknown. *Journal of the American Statistical Association* 62(318):399–402.

Lindbergh, L. (2003). *Essays on financial performance and capital structure*. Sweden: Umea University.

Lomax, R.G. (2000). *An introduction to statistical concepts for education and the behavioural sciences*. New York: Lawrence Erlbaum.

Lucas, R.E. (1988). On the mechanics of economic development. *Journal of Monetary Economics* 22:3–42.

Lutz, F.A. (1940). The structure of interest rates. *The Quarterly Journal of Economics* 55:36–63.

Makgetla, N.S. (2004). The post-apartheid economy. *Review of African Political Economy* 100:263–281.

Mankiw, N.G., Romer, D. & Weil, D.N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics* 107(2):407–437.

Mark, N.C. (1995). Exchange rates and fundamentals: Evidence on long-horizon predictability. *The American Economic Review* 85:201–218.

Martins, J.H., Laubser, M. & Van Wyk, H. de J. (1996). *Marketing research: A South African approach*. Pretoria: Unisa Press.

Massey, F.J. (1951). The Kolmogorov-Smirnov test for goodness of fit. *Journal of the American Statistical Association* 46(253):68–78.

McGregor BFA (Pty) Ltd. (2009). *Research domain*. Software and database. Johannesburg.

Meese, R. & Rogoff, K. (1988). Was it real? The exchange rate-interest differential relation over the modern floating-rate period. *The Journal of Finance* 43(4):933–948.

Merton, R.C. (1974). On the pricing of corporate debt: The risk structure of interest rates. *The Journal of Finance* 29(2):449–470.

Meznar, M.B., Nigh, D. & Kwok, C.C.Y. (1994). Effect of announcements of withdrawal from South Africa on stockholder wealth. *The Academy of Management Journal* 37(6):1633–1648.

Michaelas, N., Chittenden, F. & Poutziouris, P. (1999). Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data. *Small Business Economics* 12:113–130.

Mishkin, F.S. (1984). Are real interest rates equal across countries? An empirical investigation of international parity conditions. *The Journal of Finance* 39(5):1345–1357.

Modigliani, F. (1982). Debt, dividend policy, taxes, inflation and market valuation. *The Journal of Finance* 37(2):255–273.

Modigliani, F. & Cohn, R.A. (1979). Inflation, rational valuation and the market. *Financial Analysts Journal* 35(2):24–44.

Modigliani, F. & Miller, M.H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review* 48(3):261–297.

Modigliani, F. & Miller, M.H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review* 53(3):433–443.

Modigliani, F. & Shiller, R.J. (1973). Inflation, rational expectations and the term structure of interest rates. *Economica* 40(157):12–43.

Modigliani, F. & Sutch, R. (1966). Innovations in interest rate policy. *The American Economic Review* 56(2):178–197.

Motulsky, H. (1999). *Analyzing data with GraphPad prism*. San Diego: GraphPad Prism.

Mouton, J. (2001). *How to succeed in your master's and doctoral studies*. Paarl: Van Schaik.

Mundell, R.A. (1963). Capital mobility and stabilization policy under fixed and flexible conditions. *The Canadian Journal of Economics and Political Science* 29(4):475–485.

Musgrave, R.A. & Musgrave, P.B. (1973). *Public finance in theory and practice*. New York: McGraw-Hill.

Myers, S.C. (1984). The capital structure puzzle. *The Journal of Finance* 39(3):575–592.

Myers, S.C. (2001). Capital structure. *The Journal of Economic Perspectives* 15(2):81–102.

Myers, S.C. & Majluf, N.S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 5:147–175.

Nell, K.S. (2000). The endogenous/exogenous nature of South Africa's money supply under direct and indirect monetary control measures. *Journal of Post Keynesian Economics* 23(2):313–329.

Nell, K.S. (2003). The stability of M3 money demand and monetary growth targets: The case of South Africa. *The Journal of Development Studies* 39(3):151–180.

Niles, R. (2009). *Standard deviation* [Online]. Available at: http://www.robertniles.com/stats/stdev.shtml [31 May 2009].

Nowak, M. & Ricci, L.A. (2005). *Post-apartheid South Africa: The first ten years*. Washington: International Monetary Fund.

Ozkan, A. (2001). Determinants of capital structure and adjustment to long run target: Evidence from UK company panel data. *Journal of Business Finance & Accounting* 28:175–198.

Padayachee, V. (1995). Foreign capital and economic development in South Africa: Recent trends and postapartheid prospects. *World Development* 23(2):163–177.

Pallant, J. (2007). *SPSS survival manual: A step by step guide to data analysis using SPSS for Windows*. 3rd edition. New York: McGraw-Hill.

Pandey, I.M. (2004). Capital structure, profitability and market structure: Evidence from Malaysia. *Asia Pacific Journal of Economics* 8(2):78–91.

Parker, R.I. & Hagen-Burke, S. (2007). Median-based overlap analysis for single case data: A second study. *Behaviour Modification* 31(6):919–936.

Patrick, H.T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change* 14(2):174–189.

Pawley, M.G. (2006). The impact of survivorship bias on South African unit trust performance: 1972–2004. *Investment Analysts Journal* 64:21–26.

Pennacchi, G.G. (1991). Identifying the dynamics of real interest rates and inflation: Evidence using survey data. *The Review of Financial Studies* 4:53–86.

Posnikoff, J.F. (1997). Disinvestment from South Africa: They did well by doing good. *Contemporary Economic Policy* 15:76–86.

Quah, D. (1993). Empirical cross-section dynamics in economic growth. *European Economic Review* 37:426–434.

Quirk, P.J., Christensen, B.V., Huh, K. & Sasaki, T. (1987). *Floating exchange rates in developing countries: Experience with auction and interbank markets*. Washington: International Monetary Fund.

Rajan, R.G. & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *The Journal of Finance* 50(5):1421–1460.

Reinhart, C.M. & Rogoff, K.S. (2004). The modern history of exchange rate arrangements: A reinterpretation. *The Quarterly Journal of Economics* 119:1–48.

Robinson, J. (1952). *The rate of interest and other essays*. London: Macmillan.

Romer, P.M. (1990). Endogenous technological change. *The Journal of Political Economy* 98:71–102.

Rose, A.K. (1988). Is the real interest rate stable? *The Journal of Finance* 43(5):1095–1112.

Ross, S.A. (1977). The determination of financial structure: The incentive-signaling approach. *The Bell Journal of Economics* 8:23–40.

Rotemberg, J.T. & Scharfstein, D.S. (1990). Shareholder-value maximization and product-market competition. *The Review of Financial Studies* 3(3):367–391.

Salkind, N.J. (2004). *Statistics for people who (think they) hate statistics*. 2nd edition. London: Sage.

SARB. (Various issues). *Quarterly bulletin*. Pretoria.

SARS. (2008). Guide for tax rates/duties/levies. 5th issue, August. [Online]. Legal and Policy Division. Available at: http://www.sars.gov.za/Tools/Documents/DocumentDownload.asp?FileID=32728 [19 May 2009].

SAS. (2009). *The TSCSREG procedure* [Online]. Available at: http://support.sas.com/rnd/app/ets/proc/ets_tscsreg.html [27 August 2009].

Schall, L.D. (1984). Taxes, inflation and corporate financial policy. *The Journal of Finance* 39:105–126.

Scott, J.H. (1976). A theory of optimal capital structure. *The Bell Journal of Economics* 7:33–54.

Scott, J.H. (1977). Bankruptcy, secured debt, and optimal capital structure. *The Journal of Finance* 32:1–19.

Sharpe, T. & Koperwas, J. (2003). *Behaviour and sequential analysis: Principles and practice*. New York: Sage.

Sheskin, D. (2004). *Handbook of parametric and non-parametric statistical procedures*. 3rd edition. Florida: CRC Press.

Shimko, D.C., Tejima, N. & Van Deventer, D.R. (1993). The pricing of risky debt when interest rates are stochastic. *The Journal of Fixed Income* 3(2):58–65.

Shyam-Sunder, L. & Myers, S. (1999). Testing static trade-off against pecking order models of capital structure. *Journal of Financial Economics* 51:219–244.

Singer, J.D. & Willett, J.B. (2003). *Applied longitudinal data analysis: Modelling change and event occurrence*. Oxford: Oxford University Press.

Smal, M.M. & De Jager, S. (2001). The monetary transmission mechanism in South Africa. *Occasional Paper – South African Reserve Bank* 16:1–17.

Smart, S.B., Megginson, W.L. & Gitman, L.J. (2004). *Corporate finance*. Mason: Thomson.

Solow, R.M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics* 70:65–94.

Spiegel, M.R. & Stephens, L.J. (1999). *Schaum's outline of theory and problems of statistics*. New York: McGraw-Hill.

Stapel, M. (2009). *Mean, median, mode and range* [Online]. Available at: http://www.purplemath.com/modules/meanmode.htm [2 August 2009].

Strebulaev, I.A. (2007). Do tests of capital structure theory mean what they say? *The Journal of Finance* 62(4):1747–1787.

Stulz, R.M. (1984). Optimal hedging policies. *The Journal of Financial and Quantitative Analysis* 19(2):127–140.

Sweeney, R.J., Warga, A.D. & Winters, D. (1997). The market value of debt, market versus book value of debt and returns to assets. *Financial Management* 26:5–21.

Thomas, L., Leape, J., Hanouch, M. & Rumney, R. (2005). Foreign direct investment in South Africa: The initial impact of the trade, development and co-operation agreement between South Africa and the European Union. *Occasional Research Paper – Regional Trade Facilitation Program* 1:1–47.

Titman, S. & Tsyplakov, S. (2005). A dynamic model of optimal capital structure. *McCombs Research Paper Series No. FIN-03-06* 25 November:1–61.

Titman, S. & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance* 43(1):1–19.

Tong, G. & Green, C. (2005). Pecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Applied Economics* 37:2179–2189.

Trochim, W.M.K. (2006). *Research methods knowledge base* [Online]. Available at: http://www.socialresearchmethods.net/kb/dedind.php [31 May 2009].

Van den Heever, J.P. (2001). A note on inflation targeting in South Africa. *The South African Journal of Economics* 69:168–177.

Van den Honert, R.C. (1999). *Intermediate statistical methods for business and economics*. 2nd edition. Cape Town: UCT Press.

Van der Merwe, E.J. (2004). Inflation targeting in South Africa. *Occasional Paper – South African Reserve Bank* 19:1–15.

Vasicek, O. (1977). An equilibrium characterization of the term structure. *Journal of Financial Economics* 5:177–188.

Von Hippel, P.T. (2005). Mean, median and skew: Correcting a textbook rule. [Online]. *Journal of Statistics Education* 13(2). Available at: http://www.amstat. org/publications/JSE Ltd/V13n2/vonhippel.html. [2 August 2009].

Voulgaris, F., Asteriou, D. & Agiomirgianakis, G. (2002). Capital structure, asset utilization, profitability and growth in the Greek manufacturing sector. *Applied Economics* 34:1379–1388.

Weeks, J. (1999). Stuck in low GEAR? Macroeconomic policy in South Africa, 1996–1998. *The Cambridge Journal of Economics* 23(6):795–811.

Welman, J.C. & Kruger, S.J. (1999). *Research methodology for the business and administrative sciences*. 2nd edition. Cape Town: Oxford University Press.

White, O.R. (1974). *The split-middle: A quickie method of trend estimation*. Seattle: Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington.

Wiwattanakantang, Y. (1999). An empirical study on the determinants of the capital structure of Thai firms. *Pacific-Basin Finance Journal* 7:371–403.

Woglom, G. (2003). How has inflation targeting affected monetary policy in South Africa? *The South African Journal of Economics* 71(2):1–27.

World Bank. (2009). *Beyond economic growth: Student book* [Online]. Available at: http://www.worldbank.org/depweb/english/beyond/global/glossary.html [11 March 2009].

APPENDIX 1:

Listed industrial firms with data available for more than five years between 1989 to 2008

A-V-I
A E C I
ABACUS
ABI
ABSOLUTE
ACUITY
ADAPTIT
ADCOCK
ADCORP
ADVANCED
ADVSOURCE
ADVTECH
AF-&-OVER
AFDAWN
AFGRI
AFROX
AGI
ALEXNDR
ALIANCE
ALL JOY
ALTECH
ALTRON
AMAPS
AME
APLITEC
ARGENT
ARIES
ASPEN
ASTRAL
ASTRAPAK
AUTOPGE
AUTOQIP
AVENG
AVIS
AWETHU
BARWORLD
BASREAD
BATECOR
BATEPRO
BATSA
BEGET
BEIGE
BELL
BEVCON
BICAF
BIDVEST
BOLTONS
BOLWEAR
BOUMAT
BOWCALF
BRANSBY
BUILDMAX
BUSCONNEX
CADSWEP
CARGO
CASHBIL
CAXTON
CEMENCO
CENMAG
CERAMIC
CGS-FOOD
CGSMITH
CHARIOT
CHEMSVE
CITYLDG
CLINICS
CLYDE
CMH
COASTAL
COATES
COMAIR
COMMAND
COMPCLEAR
CONAFEX
CONSHU
CONTROL
CONVERGENT
CORNICK
CROOKES
CULINAN
CULTEL
DAEWOO
DALYS
DATATEC
DAWN
DCENTRIX
DELCORP
DELFOOD
DELHOLD
DELTA
DIDATA
DIGICOR
DISTELL
DON
DORBYL
DUNLOP
DYNAMIC
ELBGROUP
ELEMENTONE
EMERGENT
ENSERVE
EOH
EXCELL
FAMBRANDS
FARITEC
FASIC
FINTECH
FONEWORX
FORTUNE
FOSCHNI
FRALEX

FRANSAF
FRIDGEM
FURNCO
G5HOLD
GEN-OPTIC
GIJIMA AST
GLODINA
GLOHOLD
GLOPVT
GLOVIL
GOLDREEF
GOLDSTEIN
GRINDROD
GROUP-5
GUBINGS
GUNDLE
HARWILL
HEAVEN
HICORL
HIVELD
HLH
HOMECHOIC
HOWDEN
HUDACO
I-&-J
IFUSION
ILIAD
ILLOVO
IMPERIAL
INDEQUITY
INDUSTRIAL CREDIT COMPANY AFRICA
INTRADING
INVICTA
ISA
ITLTILE
JASCO
JDGROUP
JOHNDAN
KAIROS
KAP
KAROS
KGMEDIA
KING
KTL
KWV BEL
LABAT
LANGEBERG
LASER
LENCO
LIBSIL
LITECH
LOGOPT
LORNHO
M&R-HLD
MACADAM
MACMED
MALBAK
MARSHALL
MASHOLD
MASNITE
MASSMART
MAXTEC
MAXTEL
MCCAR
MEDCLIN
METAIR
METCASH
METJE-&-Z
METKOR
METROFILE
MIDAS
MIHH
MITTAL
MNET-SS
MOBILE
MONEX
MONEYWB
MR PRICE
MTN GROUP
MUSTEK
NAIL
NAMFISH
NAMPAK
NANDOS
NASPERS
NATCHIX
NEI AFR
NEIHOLD
NETCARE
NICTUS
NINIAN
NUCLICKS
NUWORLD
OCEANA
OMEGA
OMNIA
ONELOGIX
OSI
OZZ
PACIFIC
PALAMIN
PALS
PARACON
PEPKOR
PERSBEL
PHUMELELA
PICKNPAY
PIKWIK
PINNACLE
PLATE-GL
POLIFIN

PORTHLD
POWTECH
PPC
PRIMESERV
PROFURN
PTH
QLEISURE
QUEENSGATE HOTEL & LEISURE
QUICKCO
RAI
RAINBOW
REBSERV
REMBR-BEH
REMGRO
RETCORP
REUNERT
REX-TRUE
RICHEMONT
ROMATEX
S&J LAND
S&SHOLD
SA-DRUG
SA MINERAL RESOURCES
SAB
SACOIL
SAFREN
SANTOVA
SAPPI
SASOL
SCHARIG
SEAHARV
SEARDEL
SEARTEC
SECUREDATA
SEKUNJALO
SELCO
SERVEST
SETPOINT
SFG
SFW
SHOPRIT
SILVERB
SIMEKA BSG
SISA
SOFTLINE
SONDOR
SOVFOOD
SPANJAARD
SPAR
SPESCOM
SPICER
SPUR
SPURCORP
SPURHLD
SQONE
STANTRN
STEINHOFF
STELLA
STOCKS
STRAND
STRATCORP
SUNINT
SUPRGRP
TEGKOR
TELJOY
TELKOM
THW
TIB
TIGBRANDS
TIWHEEL
TOCO
TOLARAM
TONGAAT
TOURVST
TOYOTA
TRADEH
TRENCOR
TRNPACO
TRUWTHS
UCS
UNIHOLD
VALUE
VENTEL
VENTRON
VERIMARK
VOLTEX
VOXTELCOM
WACO
WBHO
WESCOB
WETHLYS
WINBEL
WINHOLD
WOOLIES
YORKCOR
Z-C-I
ZAPTRONIC